Telephony

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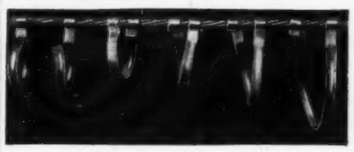

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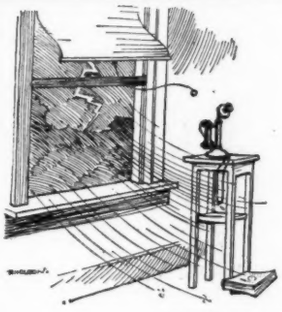

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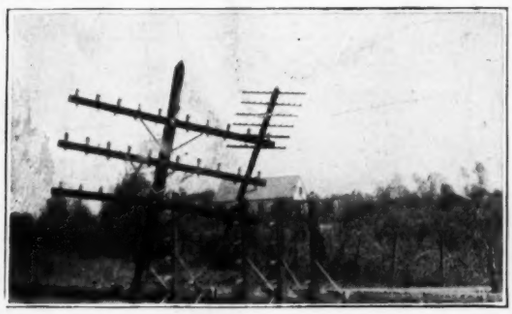

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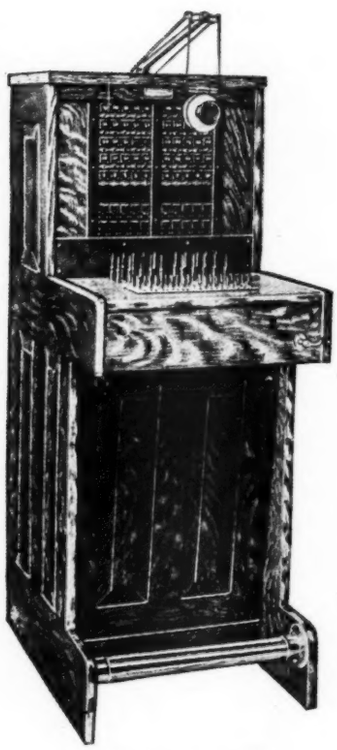

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CHICAGO, SATURDAY, NOVEMBER 18, 1916

Subscription—10 Cents a Copy
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Bill, the Troubleman, Says:

"I notice that South American business men are inclined to be chilly toward United States trade, fearing that our monopoly and trust evils will invade their country. They must know of the unfair, blighting effect of combines like the Bell Telephone and Western Electric alliance. Business men in North America have been wise to it for years, and hope that Uncle Sam will order this rotten condition cleaned up."

"No Trouble to Show Goods."

Bell licensees who have trouble getting deliveries of needed equipment from the Western Electric Co. should flash the Independent telephone emblem on the Bell factory. Then they would have no difficulty obtaining apparatus.

Evidence multiplies constantly showing that the Western is straining every nerve to obtain Independent business regardless of how much it has to neglect regular Bell orders. Here is a case in point:

November 3 an Independent telephone manufacturer received a letter from the Brocket Farmers' Telephone Co., of Brocket, N. D., stating that the company had purchased a switchboard from the Western Electric Co., "as they could make immediate delivery." Knowing how the Bell licensee operating companies are obliged to wait for equipment, this Independent manufacturer was interested to ascertain if the Bell factory really made prompt delivery or whether it offered this merely as an inducement to book the order.

On November 8 the Brocket company wrote: "We have already received our *new* board, as the Western Electric Co. made immediate shipment."

As has been frequently pointed out before, such instances show plainly that the Western Electric Co., in its unfair competition, is giving both the Independent manufacturers and the Bell operating companies a rotten deal. The Bell licensees, tied up by contract, find it almost impossible to buy anywhere else than from the Western Electric Co. That is a feature of the American T. & T. monopoly policy.

The Western Electric Co., therefore, is left free to comb the Independent field for orders to injure Independent manufacturers, and, if necessary, it "ditches" Bell deliveries to make shipments promptly to Independent buyers. Bell licensees are righteously angry over the situation. In some cases they are threatening to break the fence and buy in the open market.

Some are even now patronizing Independent manufacturers, and finding that their product is just as good for Bell purposes as is the product of the Western Electric Co., whose stuff they have been forced to buy for years without competitive bids.

It goes without saying that if the Western Electric had to compete for Bell business—as it should—it would not be able to forage in the Independent field and take business at a loss for the purpose of injuring Independent manufacturers.

Under fair competitive conditions the Bell factory would have to secure and handle Bell business on the same terms as other concerns solicit patronage. Furthermore, the Bell factory would not have time or money to employ the cut-throat tactics it now uses to get a small order from an Independent, which, compared to the Bell patronage, is a mere drop in the bucket.

Under fair competition, the Bell factory would not be able to offer an Independent telephone operator in North Carolina a free trip to Chicago if he would buy a Western Electric switchboard. We have information that this is what a Bell salesman did offer, within the last 30 days. The profits from Bell licensee business, no doubt, are sufficient to meet these extraordinary expenses in trying to divert Independent trade from Independent manufacturers to whom it legitimately belongs.

The question is—how long will the Bell licensees stand for this unbusinesslike situation?

A more important question, however, is—how long will the federal authorities at Washington, who are supposed to estab-

lish and preserve honest and fair competition, permit this intolerable condition?

A Knock or a Boost?

In Collier's for November 11 is an entertaining article by Julian Street entitled: "American Adventures—A Bit of West Virginia." It is an interesting account of a travel tour through sections of that state and begins with the following paragraph:

> Almost all modern European critics of the United States agree in complaining that our telephones and sleeping cars are objectionable, and that we are "standardized" in everything.
>
> Their criticism of the telephone seems to be that the state of perfection to which it has been brought in this country causes it to be widely used, while their disapproval of our sleeping cars is invariably based on the assumption that they have no compartments—which is not the fact, since most of the great transcontinental railroads do run compartment cars and much better ones than the *wagons lits*, and since, also, all our sleeping cars have drawing rooms, which are incomparably better than the most comfortable European compartments.

Mr. Street then proceeds to discuss the criticism that life in the United States is "standardized," which, he says, will bear a little thought.

So far as his allusions to the telephone is concerned, we are obliged, at the risk of being accused of being slow-witted, to admit that we do not "get" him at all. In the first place, "almost all modern European cities," do not complain that American telephones are objectionable. On the contrary, most foreign visitors—particularly those from England and France—are loud in their praise of our telephone service. They admit that their own is wretched in comparison, as indeed it is known to be.

Possibly, Mr. Street is trying to hit at the English lack of humor by inferring that they complain of American telephone service because it is so widely used. Or it may be that he is really complimenting our telephone perfection and we, ourselves, are too dull to see it.

Anyway, there is something wrong somewhere, for the only real complaint that can be lodged against the American telephone situation is that the Bell crowd is injuring the industry by its blind policy of unfair, illegal competition and its contemptible treatment of the Independent telephone interests.

Commissions, Courts and Councils

Discussions and Rulings of State Bodies Having Supervision Over Telephone Companies—Decisions of Courts in Matters of Interest to Public Utilities and Actions of City Councils Relative to Franchises, Rates and Service

Illinois Commission Orders Invading Company to Withdraw.

The question of invasion by a telephone company of territory occupied and served by another telephone company recently came before the Illinois Public Utilities Commission in the form of a complaint by the Northern Illinois Telephone Co. against the Farmers Telephone Co. of Sandwich (4299). It appears from the record in this case that both companies have their principal place of business in Sandwich, and that the Northern Illinois Telephone Co., organized in 1898, has about 3,370 subscribers in and around Sandwich, while the defendant company, organized in 1908, has about 25 subscribers.

Between the time of the filing of the complaint and the hearings held in this case the respondent constructed several miles of telephone lines in the rural district southeast of Sandwich and connected these lines with its then existing rural lines that enter Sandwich from the south. These new lines for the most part parallel the wires of the complainant and are located in territory which, prior to their construction, was occupied exclusively by the telephone system of the complainant.

By constructing these lines the respondent secured some 15 subscribers to its system, who were theretofore subscribers to the telephone system of the complainant. In other words, the respondent without a certificate of convenience and necessity from the commission invaded the territory of the complainant and secured some of the former patrons of the Northern Illinois Telephone Co.

No complaint is made as to either the rates or service of the complainant in this case and the record shows that the service furnished by the Northern Illinois Telephone Co. is equal, if not superior, to that of the respondent.

The respondent company contended that it had the right to build the new lines in question and that in so doing it has merely extended and added to its telephone system; therefore, that a certificate of convenience and necessity from the commission was not necessary.

As in the case of the Byron Telephone Co. against the Rock River Telephone Co. (3,000), the commission overruled this contention. The Farmers' Telephone Co. of Sandwich, therefore (as was the Rock River Telephone Co.), is ordered to remove or otherwise dispose of the telephone lines and equipment with which it invaded the territory of the complainant.

Minnesota Company Protected in High Tension Controversy.

Alleging that the high tension line of the Commonwealth Utilities Co. had seriously interfered with the operation of some of its telephone lines in its Winnebago, Blue Earth and Elmore exchanges, the Blue Earth Valley Telephone Co. of Blue Earth, Minn., applied to the district court for relief, and a restraining order was issued October 23.

The hearing on the application for injunction was held before Judge Comstock in the district court at Mankato on October 31.

The ruling of the court requires the telephone company to move some of its leads and reconstruct others so as to eliminate, as far as possible, the interference from the operation of the high tension line; to make such changes as early as practicable and to then bring into court its claims for damages.

The power company, according to the ruling, is required to put up a $10,000 bond to insure the telephone company against loss and damage by reason of the injury to service, the expense of making the required changes, and possible accidents to employes and others to whom the telephone company might be responsible.

Upon the filing of the bond the Power company will be allowed to operate its transmission line from Winnebago to Elmore between the hours of 5 p. m. and 7 a. m.

The Commonwealth Utilities Co., whose headquarters are at Mankato, and whose officers are the same as those of the Commonwealth Power Co., also of Mankato, last spring began the construction of a transmission line from Winne-

bago to Elmore, Minn., and thence to points in Iowa. Against the protests of the Blue Earth Valley Telephone Co. the power company paralleled and overbuilt some of the leads of the telephone company and the telephone company finally applied to the courts for redress.

The Northern States Power Co. operates a transmission line from Rapidan to Winnebago and supplies current at that point to both the Commonwealth Power Co., which operates the local lighting system in Winnebago, and to the Commonwealth Utilities Co., which takes current from that point over its transmission line south to Elmore and other points.

As a result of the controversy between the Blue Earth Valley Telephone Co. and the Commonwealth Utilities Co., the officers of the latter company are now agitating second telephone exchanges in both Winnebago and Elmore, and their representatives are soliciting signed endorsements of such second exchanges, with promises of "metropolitan" and "common battery" service.

Merger at Los Angeles, Cal., Authorized by Commission.

Consolidation of the Pacific Telephone & Telegraph Co. and the Home Telephone & Telegraph Co. in Los Angeles was authorized November 4 by the California Railroad Commission. The Southern California Telephone Co., a new corporation, is authorized to purchase the properties of the two companies in Los Angeles and to issue in payment therefor securities in the amount of $14,000,000.

Of these securities $9,330,000 or less are to be 5 per cent. 30-year bonds and the remainder stock.

A feature of the decision is the order made with respect to the combination of the automatic system hitherto conducted by the Home company with the manual system of the Pacific. These are to be maintained at the desire of the subscribers, so that either service may be had and so that a user of an automatic telephone may obtain a connection with a manually operated telephone, or vice versa. The automatic users will also have access, without discrimination, to the long distance wires.

The decision is made effective with the understanding that there will be no demand for an increase of rates by the new corporation for a period of at least five years.

Fear of Law Held as Valid Reason for Breaking Contract.

Fear of the Sherman anti-trust act is a valid reason for breaking a contract, according to a decision recently by the United States Circuit Court of Appeals at San Francisco, Cal., in the case of the Davenport Independent Telephone Co. of Washington against the Pacific Telephone & Telegraph Co. The Pacific company agreed to purchase the Davenport company for $34,623, but when the United States government had the Pacific company enjoined, under the Sherman act, from purchasing companies in Oregon, it decided not to purchase the company in the neighboring state of Washington.

The Davenport company sued to have the contract carried out, and secured a judgment in the United States District Court of Washington.

The Circuit Court of Appeals reverses the judgment of the lower court. The judges of the appellate court hold that the Pacific company did right in accepting advice of its counsel that the purchase of the smaller company might bring the larger company into conflict with the government.

Damages for Delay in Communicating With Physician.

Where a patron of a telephone company, unable to call by the telephone a physician to attend his injured child, sustained a physical injury by being obliged to walk to the physician's residence, he could recover damages for mental distress caused by delay in communicating with the physician and delay of the physician in arriving to treat the child, who died before the arrival of the physician.—Vinson vs. Southern Bell Telephone & Telegraph Co.; Supreme Court of Alabama; 66 Southern, 100.

Liability of Telephone Company for Injury to Pedestrian.

Where a telephone company placed its pole in a city's street, and a pedestrian was injured by falling into a depression about such pole, the primary liability was put upon the telephone company by law, even without the company's bond to save the city harmless. Where a telephone company and a city, sued jointly by a party who fell into a depression about a telephone pole in the city's street, agreed to make a joint defense in the case and combine their forces, such agreement contemplated only a common defense to the suit, and was not intended to affect rights as between the telephone company and the city.—Kinloch Telephone Co. vs. City of St. Louis; Supreme Court of Missouri; 188 Southwestern S. W., 182.

Injury in Rescuing Son from Fallen Electric Wire.

Action was brought against a village operating an electric light plant, and a telephone company, for an injury to the plaintiff from an electric shock while trying to rescue her son from contact with a fallen electric light wire which caused his death.

The admission of the testimony of the plaintiff's expert witness that a crossing of the electric light wire was 8 to 14 ins. from the telephone wire, and in view of the long span too heavy for a pole to support without a guy, was dangerous, and that the wires would not be safe unless placed about 40 ins. apart, was held admissible by the court over the objection that it involved the direct issue for the jury.—Sykes vs. Citizens Telephone Co.; Supreme Court of Michigan; 159 Northwestern, 325.

Cutting of Service for Charges Under Prior Contract.

A public service corporation, as a telephone company, may breach its contract by refusal to continue service after the patron's failure to make payment there-

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for when due. A contract for telephone service to a subscriber, providing that upon non-payment of "any sum due" the company might suspend the service until all charges to the time of its restoration should be paid, was indorsed to the effect that it "supersedes prior contract."

The court held that the company had no legal right to discontinue telephone service to the subscriber because of an unpaid balance due it under a contract which had terminated prior to or at the time of making the latter contract, since the rights of the parties would be fixed according to the terms of the contract existing between them, and since the word "supersede" means to make void, inefficacious, or useless by superior power, or by coming in place of; to set aside, render unnecessary, suspend, or stay.—Taylor vs. New York Telephone Co.; Supreme Court of New York; 160 New York Supplement, 865.

Voters Uphold Council's Action on Buffalo Merger.

At the general election on Tuesday, November 7, the voters of Buffalo, N. Y., upheld the action of the city council in approving the proposed merger of the Federal and New York telephone companies in the city of Buffalo. The specific question upon which the majority of voters cast a negative vote was as follows:

Shall the resolution of the council of the city of Buffalo adopted on September 29, 1916, granting permission to the Federal Telephone & Telegraph Co. to sell its physical properties to the New York Telephone Co. be repealed?

Court Will Protect Owners of Shade Trees.

An owner of residence property who rightfully planted shade trees within the street and maintained them, except as against the superior right of the state by its proper authorities to maintain and improve the streets for public purposes, had a property right in them, which the court would recognize and protect.

A claim of right to "trim" trees "under the instructions of the city council," if any, conferred no right to destroy and remove the trees.—Newlands vs. Iowa Railway & Light Co.; Supreme Court of Iowa; 159 Northwestern, 244.

Lineman May Recover Damages for Personal Injuries.

A lineman was employed for nearly a year in constructing and repairing wires in several states for signaling and operating trains, both local and interstate. When injured, constructing telephone wires on poles carrying interstate commerce between a station and transfer point handling local and interstate traffic, the court ruled that he may recover under the federal employers' liability act (April 22, 1908, c. 149, 35 Stat. 65 [U. S. Comp. St. 1913, §§ 8657-8665]).—Collings vs. Michigan Central Railway Co.; Supreme Court of Michigan; 159 Northwestern, 535.

Toll Charge Inaugurated Between New York Towns.

Commencing November 15, subscribers of the New York Telephone Co. in Argyle, N. Y., will be required to pay a toll charge of 5 cents to communicate with parties in Hudson Falls and 10 cents to get in touch with Glens Falls. At present there are no toll charges for Hudson Falls and Glens Falls calls. Free calls between Argyle and Fort Edward will be continued.

Increasing business in Argyle and the necessity for better service are stated by the company to be the reasons for the inauguration of the toll rates.

Russian Government May Operate System in Moscow.

Negotiations are reported to be in progress between the Russian post and telegraph department and the Swedish-Danish-Russian Telephone Co. with regard to the purchase by the state of the telephone exchanges in the Moscow district.

The franchise of the telephone company will expire within a short time and it is stated that it is not to be renewed.

Addition Planned to Telephone Exchange at Erie, Pa.

The Mutual Telephone Co., of Erie, Pa., has obtained a building permit for the erection of a 40 by 40 ft. addition to the rear of its present exchange building at 19-21 East Ninth street. The addition is to be of steel and concrete construction and its cost is estimated at $11,000.

Summary of State Commission Hearings and Rulings.

CALIFORNIA.

November 4: The commission authorized the consolidation of the Pacific Telephone & Telegraph Co. and the Home Telephone & Telegraph Co. in Los Angeles. The Southern California Telephone Co., a new corporation, is authorized to purchase the properties of the two companies in Los Angeles and to issue in payment therefor securities in the amount of $14,000,000.

November 6: Supplemental application filed by the Santa Barbara Telephone Co., the Home Telephone & Telegraph Co. of Santa Barbara, the Pacific Telephone & Telegraph Co. and the Sunset Telephone & Telegraph Co. for authority for the issuance and exchange of securities necessary to perfect the amalgamation of the telephone systems in Santa Barbara. The authority to amalgamate was given to the companies by the commission recently on the condition that the amount of securities proposed to be issued by the new merger company be materially reduced.

CANADA.

November 2: The Ontario Railway & Municipal Board authorized the Mallorytown Telephone Co. of Mallorytown, Ontario, to increase its rate from $10 to $15 a year.

MINNESOTA.

November 24: Hearing at St. Paul in the matter of the application of the Tri-State Telephone & Telegraph Co., of St. Paul, for permission to purchase the physical properties of the Minnesota Telephone Co., of Brainerd, Minn.

NEW JERSEY.

November 16: Further hearing on the investigation of rates charged by the New York Telephone Co. and the Delaware & Atlantic Telephone & Telegraph Co. in the state. An appraisal of the companies' properties was to have been submitted at this time.

NEW YORK.

November 17: Hearing at New York on the complaint of Elizabeth Riley against the New York Telephone Co. as to charges for semi-public telephone installed at 142 West Thirty-fourth street, New York City.

OHIO.

November: Petition filed by B. T. Calloway, owner of the Beach City Telephone Co. of Beach City, Ohio, for authority to sell his property to the Brewster Telephone Co.

PENNSYLVANIA.

November 13: Hearing at Harrisburg on the application of the Middletown Telephone Co. of Middletown, Pa., for the approval of the sale of its stock, franchises, property, rights and credits to the Cumberland Valley Telephone Co. of Harrisburg, Pa.

November 13: Hearing at Harrisburg, Pa., on the application of the Central District Telephone Co. for the approval of an ordinance granted September 25, 1916, by the council of the borough of Carrick, Allegheny county.

November 14: Formal application made by the Keystone Telephone Co. for a rehearing in connection with the desired lease of its conduit system in Philadelphia by the Philadelphia Electric Co. The company asks for a certificate of public convenience to permit it to lease a portion of the system to the electric company, holding that the agreement of compensation of $300,000 is an amicable one. The city of Philadelphia will contest the reopening of the case on the ground that the proposed contract would work a hardship on the consumers of the electric company, in accord with a recent contention of the commission upon the initial hearing.

SOUTH CAROLINA.

November 28: Hearing on the question of allowing an increase in telephone rates for the town of Manning, S. C.

WISCONSIN.

November 14: Hearing in the case of Marx Brothers & Barth et al. vs. the Chicago, Milwaukee & St. Paul Railway in regard to telephone in station. R-2.

November 16: Hearing at Fairchild, Wis., in the case of R. L. Frisbie et al, vs. the Central Wisconsin Telephone Co., in regard to service. U-985.

November 16: Hearing in the case of the Glidden Telephone Co. vs. the Ashland Home Telephone Co., in regard to the division of tolls. U-984.

November 16: Hearing in the case of the Ashland Home Telephone Co. vs. the Glidden Telephone Co. U-990.

November 24: Hearing in the matter of the application of the Door County Telephone Co. of Sturgeon Bay, Wis., for authority to increase rates. U-991.

Cost Basis for Telephone Rates

Value of Service and Not Costs of Serving the Various Classes of Subscribers Considered in Rate Studies—Importance and Limitations of Cost Analyses in Fixing Rates—Fundamental Principles of Apportionment of Expenses

By George C. Mathews

Not many years ago it would have been useless to talk to telephone men of cost accounting or of analyzing costs to determine the cost of each class of service furnished. The tremendous growth of the telephone business has kept everyone hustling to keep up with the demands for service. Construction, operation, maintenance—these three have been all engrossing. So rapidly has the public in this country responded to the advantages of telephone service, so insistent have been the demands upon capital and labor, that telephone men who have been able to keep abreast of the demand have felt that the time had not come to concern themselves with matters not directly productive of telephone plant or of telephone service.

Cost of Each Class of Service.

Together with the fact that the telephone men have been too busy with other matters to concern themselves with what each branch of their business cost, there has been a prevalent belief that the telephone business is one in which it was impossible to ascertain the cost of each class of service. The unit of product was considered too intangible, the inter-relation of subscribers too complex, to admit of the cost being determined.

Meantime, the development of the cost principle in other lines of public service business has become a matter of history. The literature of the electrical business is replete with discussions of methods of cost analysis. Theories as to rates, methods of fixing rates, types of rate schedules, have been the subjects of investigation and presentation during the years in which the electric business was making its most rapid advances. Somewhat similar has been the history of the gas and water supply industries. In the telephone business, alone, has there been almost nothing done in a comprehensive way in applying cost principles to rate schedules.

Studies of Rate-Fixing Methods.

This does not mean that there has been no development in methods of fixing telephone rates. On the contrary, the studies which have been made of telephone rates have, in their way, been unsurpassed in any line of utility business. In these studies, however, the emphasis has been placed upon the value of the service. The cost has been of only general interest as indicating the extreme beyond which it would be unwise to go in attempting to attract new business.

Nor have the telephone companies, alone, been slow to apply the cost of service principle. Almost without exception, public service commissions have hesitated about attempting to apply to the matter of telephone rates any such analytical processes as have very generally been brought to bear upon rate questions of other public utilities. Recently, however, our regulating bodies have given evidence of a tendency to change their methods.

Analysis of Switching Costs.

The earliest cases in which commissions were squarely confronted with the necessity of finding the cost of service were cases involving the charge to be made by one company for switching service performed for another company. Both the Illinois and Wisconsin commissions have made analyses to determine the cost of switching service.

Under the physical connection laws, which have been a very important part of telephone legislation of the last few years, the importance of cost-finding has become evident. It is questionable whether the courts would uphold as reasonable any order of a commission regarding physical connection, whether on a switching rate or a toll rate basis, in which the charge for connection was fixed below cost. Commissions, therefore, must either find the cost of the service or fix the rate high enough so that there can be no question as to its covering the cost.

Other Cost Analysis Work.

Following the work done in analyzing the cost of switching service, the Wisconsin commission has gone into the matter further. In two cases it has made a complete examination and determined the cost of every class of service. The decision on the first of these, that in the case of the St. Croix Telephone Co., was published in full in Telephony in the issues of December 18, 1915, to January 8, 1916, inclusive. In the second case, decided in the spring of 1916, the cost of service was ascertained for all the classes furnished by the Milwaukee exchange of the Wisconsin Telephone Co. and it served as a basis for the decision of the commission revising the rates of that exchange.

While the work done by the Wisconsin commission has demonstrated the possibility of finding the cost of each class of service, it has also served to show that the cost of service can be accepted in telephone rate making only in connection with other factors. This is precisely what is true of the public utility business generally. There are points at which the computed cost must be modified to constitute the practical rate, just as there are points at which the computed cost of service must be departed from in fixing rates for electric service. Competition with other forms of lighting must often modify the rate to the small user, and competition with other forms of power must influence the rates for very large users.

It cannot be expected that telephone rates for all classes of service will yield the same margin of profit, any more than is the case in other lines of utility business. The modifications which it may be necessary to make in the cost of each class of service, however, do not destroy the value of a knowledge of the costs. Unless the costs are known, the telephone company does not know whether any particular rate is or is not remunerative, nor what adjustments can be made in rates without entailing a loss. In other words, a knowledge of these costs is one of the essentials to proper rate making, though it clearly is not the only essential.

Value of Service.

The value of the service, though hard to measure, can nevertheless be determined within certain broad limits. Knowledge of the value unquestionably serves a very important purpose in connection with rate making. Commercial considerations are also important, but if one can measure the cost and the value of the service, the next most important consideration is the effect which the schedule will have upon operating conditions.

The rates for various classes of service should not only reflect the cost and the value of the service, as closely as practicable, but they should bear such a relation to each other that the tendency will be for patrons to select the class of service which they really need. To illustrate: An improper relation between

rates for unlimited business service and rates for private branch exchanges may retard the growth of private branch exchange business. The practical result will be that subscribers will be taking the ordinary business service when their requirements are too great for that class of service.

The company's customer is not the only one affected. The company must stand the burden of operators' time wasted in reporting the line busy and complaints from other patrons wanting to use the line. Similarly, in the residence classes the schedule should, so far as possible, be adjusted so that parties who really need single party service will take that service and not cumber the party lines with their frequent use of the telephone.

The telephone company which sees only the cost of service may go as far wrong in fixing a workable schedule as the company, which looks only at traffic conditions, may go in adjusting the schedule to the cost of service.

Neither the intangible nature of the unit produced by a telephone company nor the inter-relation between subscribers, is a real obstacle in the way of the division of the expenses of the telephone business among the classes of service, although the interdependence of subscribers does make the task much more difficult than it would be otherwise.

The Unit of Product.

The unit of product, the message, can be recorded either by means of a meter in the case of single party measured service, by the use of switchboard sheets for party line measured service, or by actual traffic counts over short but fairly representative periods of time. Because the first two methods do not show the class of service called, they will not serve as a basis for apportioning the expenses, relating to both parties—the calling and called—between the parties.

We have often heard it said that the telephone business is different from the business of other public utilities in that two parties are necessary for the use of each unit of service—one calling, the other party called. Although it is true that the telephone business involves a greater degree of interdependence of patrons than other utility business, this relationship is not a bar to a fair analysis of the cost of service. The actual methods to be used in finding the cost of service will be explained later. For the present we may ask ourselves: What is there in the situation which makes such analysis of special importance at the present time?

The answer is to be found in the nature and history of the telephone business. First of all, the telephone business, for the majority of companies, has not been a business of excessive profits, public opinion to the contrary notwithstanding. Plants were started in a small way and with very low rates. They have grown far beyond original expectations, until their business is now conducted on a scale that was not contemplated when the existing rates were established.

Secondly, the prices of material and labor have increased so far beyond those of a few years ago that rates based on former prices are no longer adequate. It is true that methods of operation have become more efficient and that economies have tended to offset increased prices, but for the vast majority of telephone companies such economies have not been sufficient to compensate for increased prices.

Small Profits or Increased Rates.

The result is that for the most part the telephone business seems to be facing either a period of small profits or one of increased rates. It is no exaggeration to say that by far the larger part of the telephone cases coming before state commissions, result in increased rates and only a very small number in decreases. With this condition prevalent to a very considerable extent, it becomes important that changes in rates, when made, should be so made that as far as possible all classes of service become profitable—that each class shall meet the cost involved in supplying it with service and contribute a fair share toward the return which the company should have on its investment. Here the necessity of determining costs becomes evident.

Public service commissions have been slow to undertake inquiries into the cost of serving various classes of subscribers, probably because no generally recognized methods of cost finding have been established. Some commissions have even gone so far as to hold that investigations should not be made by the commission. They contend that the burden of proof rests upon the companies to show the necessity for proposed increases and to present evidence for the consideration of the commissions, instead of having the commissions make the investigations into such facts as they deem pertinent.

In other words, some of the commissions take the position that they are merely boards of review and not bodies to conduct original investigations. What development occurs in the telephone rate situation must therefore be due to the activities of the companies rather than of state commissions.

Governing Principle in Cost Analysis.

Before we can consider in detail the methods to be used, we must settle upon the principle which should govern in dealing with the question of the inter-relation of subscribers and its bearing upon the cost of serving different classes of subscribers. The most common view of this is that the subscriber who originates a call is responsible for the cost of handling that call and that a cost-basis rate would charge the entire cost of the call against him. This looks well enough when applied to an individual message. But when we look a little further into the telephone business as a whole, such a method appears faulty.

Let us illustrate this by calling attention to the relation which exists between a class of service in which a charge is made for each call and one which is on a flat rate as, for example, the four-party residence nickel class and the one-party unlimited business class. Every telephone man, whose exchange handles both nickel and flat-rate service, is familiar with the fact that flat-rate users as a rule originate more calls than they receive and that nickel and measured service classes receive more calls than they originate. The merchant who has unlimited service calls up his customers who have nickel telephones, although if both classes had unlimited service the direction of many of the calls would be reversed.

Calls and Classes of Subscribers.

In one traffic study which the writer has in the mind, the following relation was found between calls originated and calls received by certain classes of subscribers for the period covered by the traffic count:

	Originated.	Received.
One-party business, flat rate	42,580	40,132
One-party business, measured	9,248	12,945
Four-party business, nickel	4,881	8,407
One-party residence, flat rate	28,977	18,137
One-party residence, measured	1,352	1,420
Two-party residence, nickel	1,035	2,046
Four-party residence, nickel	12,319	27,762

These classes of service, selected from the complete list of classes covered by the traffic study, are sufficient to indicate the tendency for flat-rate classes to be classes of heavy originating business and for nickel and measured service classes to show a preponderance of terminating traffic. This tendency on the part of the nickel and measured service classes is particularly noticeable in the four-party classes where the guaranteed originating traffic is small.

Although it may seem, therefore, that the party who originates a particular message is responsible for all of the expenses of handling that message, the actual result of present-day schedules is to reverse the normal direction of a considerable part of the traffic, and the

measured and nickel classes are therefore really responsible for much more of the telephone traffic than they originate.

Taking telephone traffic as a whole, it seems that subscribers have as much interest in the ability of other subscribers to call them as they have in being able to call others. On the whole, it cannot be said that the direction of traffic is a measure of its importance to the parties concerned. Exceptions to this there, of course, are, but in such instances the message may not always be more important to the party calling than to the party called. It frequently happens that such is the case.

The fundamental principle, then, seems to be that in telephone traffic, generally, both parties to a conversation should bear the burden of its cost and that an equal division of such cost between the parties is the most equitable division possible. With this principle in mind, we may proceed to a consideration of the methods to be used in finding the cost of each class of service.

The Telephone Business

A Safe Course—Protecting Investors—Paper Presented at Annual Convention of the Illinois Independent Telephone Association

By J. C. Kelsey

It has been said that the strength of a race or a nation is dependent upon its consideration and protection of its women folk. The weakness of the negro race, for instance, seems almost entirely due to the fact that its men do not realize or feel the necessity of protecting its females.

No race nor nation can travel a safe, sane and constructive course which does not zealously guard mother, sister, daughter, and exert every effort to make their lives comfortable and secure. The Caucasian race today stands supreme because it has always recognized the fundamental rule of successful and powerful perpetuation—the protection of its women folk.

In the same breath it can be said that no industry can successfully perpetuate itself which does not realize and feel the necessity of protecting its investors.

No public utility nor any business can travel a safe, sane and constructive course which does not zealously guard the rights of its investors—young, middle-aged and old—and exert every effort to make their investment secure, their income ample and permanent, and free them from anxiety and worry.

Investors, particularly stockholders, in the face of a deficient management, are just as helpless as the mothers of our race in the face of great physical peril. Investors are merely the mothers of our investments after all.

It is no fault of the investor that a property is not earning properly. The investor put his money in on good faith and in full belief that the promoters or managers were capable men.

If the management of an investment sits quietly by and makes no effort to resist economic destruction, we will have a result no different than when a father sits by and watches a daughter dragged from her home.

If there is anything wrong with the telephone business today, it is the fault of the management and no one else.

I wonder if we have a full appreciation of our responsibility toward investors. Nearly all investments are made from savings, which are always a result of some sacrifice or self denial. No man ever saved a dollar which did not represent a decision to do without something he really wanted.

With the cost of living, since you came into existence, as high as it is and has been, you know that every dollar you have beyond that which you owe, is because you wore an overcoat an extra year or two, your wife retrimmed her hat and still is trying to get up nerve to buy a winter coat she really needs, and the old automobile has run up 40,000 miles or so.

Using investors' money is serious business. The use of it should be made by law as sacred as life and vested property. Every one remembers what the failure of the New Haven Railway meant to countless families of New England.

If the telephone business is to be successful and live onward to its possible destiny, it must realize that its first duty is to the men and women who gave it the necessary money to begin business. The protection of our investors is the only real, sane and safe course for every telephone man to travel.

The decalogue of the telephone business should be memorized and obeyed by every telephone man in existence. I don't know a single sentence in our language which means more than the following declaration:

"The telephone business must receive sufficient gross revenue to pay all operating expenses, including a proper provision for depreciation, and yield such net revenue as will pay to the investors adequate compensation for their money, and so establish the credit of the company that it will be enabled, by the sale of its securities, to secure the money needed each and every year for the extensions and additions to the property necessary to meet the demands of the public."

This decalogue should be framed in your office. It should be imprinted on your stationery. Every bill sent to the public should have this declaration of your rights and intentions. Your operators should learn it, and your linemen should be able to repeat it as easily as the shortest verse in the Scripture.

It should be read into your corporate life because it means exactly the reason why you went into business, why you coaxed investors into your enterprise and why the public accepted your service.

You are in business for no other reason—to receive sufficient gross income to stay in business.

The telephone business, in order to compare favorably with other lines of endeavor, must have these three requirements:

The income from the use of your property should yield such revenue as will pay the investor adequate compensation.

The income from your property should yield such revenue as will protect the investment of the investor by setting aside a sum sufficient to provide for depreciation and thereby keep the investment unimpaired.

The income should yield enough to pay your daily operating expense and allow your employes sufficient wage to meet the complex demands of the latter-day civilization.

Then, the most important thing, the sale of securities to meet the growing needs of a telephone property, will follow automatically.

If the management of a telephone business has fully learned and realized this, it will never again wear out shoe leather trying to sell securities at ruinous prices

to a bunch of financial four-flushers in the so-called money centers.

The so-called money centers are merely borrowing centers. Borrowers, only, exist there and they finally borrow the money which really comes from your home town.

If you succeed in interesting anyone in a money center, you will find in your contract that 80 per cent. of the money sought must come from your very home. This is a fact which must be learned and realized, for our business cannot afford the expense of money and time in hopeless search for money among strangers.

If the management has learned the decalogue and fully digested it, every dollar will be quickly taken at home. It is merely a voluntary act, dependent upon the management of the company itself.

No telephone company is legally bound to have disappointed investors and thereby close the local money market. The courts specifically say: "What the company is entitled to demand in order that it may have just compensation, is a fair return upon the reasonable value of the property at the time it is being used by the public."

Could anything be more simple than this declaration, which recognizes that no race, nation or business can exist without just compensation?

The creation of a public utility commission gives no telephone company reason for fear. No right has been abrogated and the courts still exist for the protection of your property rights.

The law restricts the telephone business from earning too much, and by the same token says as a mutuality that you are not compelled to earn too little, unless you desire to do so. That really is the point of this story.

We have no real right to blame anyone but ourselves for our failure to realize the necessity of protecting our investors. Our rights are plain as the nose on the human face.

The courts and commissions are fully organized, really and truly waiting for a business to come to them and assert its understanding of their responsibilities. We surely cannot expect the courts and commissions to reach out and beg us to come in and hear a decision in our favor —that is expecting too much.

But court, law, traditions, economics and all, cry out in the market place, telling us what the business needs to protect itself. The only question is whether we will give heed and use their good offices.

There is not another vital problem before the telephone business. It is true that we have viewed and still view mergers and purchases by the Bell interests with much alarm. And we have reason to be alarmed, too, but beneath it all lies the fundamental reason—the merged property has not taken proper care of its investors.

The management of the property, in every case, never learned the decalogue and missed the very point of successful existence. It never had the nerve to charge enough for its services.

No telephone property is for sale, of which the management is efficient enough to receive sufficient gross revenue for just those essentials which have been enumerated.

Do you think Buffalo or Chicago would have gone from us if operating expenses, depreciation and dividends had been normally earned? Do you think that the Florida properties would have been sold if the investment had been handled well enough to attract money to make the improvements demanded by the public utilities commission?

Does it not strike you as a coincidence that practically every Independent telephone company which has gone out of business, never had a true conception of the investors' rights? It gets back to the race, or nation, which does not respect its women folk—nothing can help.

The telephone business is a vital one. No business on earth has undergone such a test and lived through it. Ruthless competition and extravagant warfare has marked its path, yet it goes on and on, until we now know we can be a permanent earthly fixture.

It has solved most of its complexities. No longer does a board of directors of any Independent company blanch at the thought of foreign invasion. No longer does the bogie man of patent power and money power bother us.

We merely laugh at such suggestions. Our troubles, if any, are local as well as voluntary. No act of God or involuntary human agency threatens the telephone business.

Every telephone man has a mine of opportunity right under his feet. There is no use of dreaming of gold mines and oil wells in other lands—these are uncertain. The facts show that more money has been sunk in the ground than has ever come out.

No law says that a gold mine or an oil well has a sure thing—but the telephone business has such a promise. The law distinctly says the telephone business has. It distinctly says that the telephone business has the right to be placed on a par with all other business activities. In fact, you are guaranteed that. Can anyone ask for more?

No telephone man is worrying about foreign troubles. The Bell bogie has long been buried.

It is safe to say that your greatest worry is—where the money is coming from to pay expenses, deprecation, dividends and extensions? I can tell you where it is coming from—right from the pockets of your thrifty investor friends. They will cheerfully give you all the money you want if you will give it proper stewardship—and the law says you have no reason to do otherwise.

Do not complain that it will be hard to raise the rates. We know it will be hard. Do not complain that the commission will make you work—they will, and you need the exercise.

Do not complain that your friends and patrons will abuse you. We know they will, but do not forget that a man commands respect only by strong and respectful methods. Unless you take steps to raise your rates, no one else will.

The telephone business is the best and most reasonable business on earth. If it is not, it is because we fail to use our opportunities which are literally thrust at us.

It cannot come into its own unless it earns expenses, depreciation, dividends and thereby solves the problem of extention. The law says we can do it. It is our only safe course. Will we follow this course?

MORAL: Most everything is voluntary.

Convention of Ohio Independent Telephone Association.

The Ohio Independent Telephone Association will hold its annual convention on Thursday and Friday of next week, November 23 and 24, at the Hartman Hotel, Columbus, Ohio. Reports received from all sections of the state indicate that in point of attendance this convention will surpass any previous meeting of the association.

The first day will be taken up with matters of special interest to officers, directors and stockholders of telephone companies, ending with a banquet in the evening. The second day will be given to both the technical and commercial sides of the business and the completion of the official program of the convention.

Kansas Convention Promises to Be Biggest in History.

Having made a gain of 22 per cent. in membership during the past year, the Kansas Independent Telephone Association expects that its coming convention, which is to be held in Topeka on December 19, 20 and 21, will be the largest, most important and most interesting meeting held in the history of the association. As this meeting will be held just before the session of the legislature, Secretary J. H. Close urges every member to attend.

"Telephony's" Home Study Course for Telephone Men

A Complete Presentation of the Principles Underlying Modern Telephony in All Its Branches—Arranged Systematically So That Regular Reading and Faithful Study Will Qualify Ambitious Men for Higher Positions—Prepared Under Supervision of Stanley R. Edwards—This Section Written by Jay G. Mitchell

Quiz Questions on the Preceding Installment.

517. Why should comparisons as to current demand for various systems be reduced to the watt-hour or power basis?

518. Why are automatic and semi-automatic telephone switching systems not inefficient?

519. What factors have most weight in determining power demand for any given set of conditions?

520. What bearing has ampere-hour efficiency on charging schedules?

521. Illustrate unreliable character of voltage as an indication of discharge.

522. What is the distinction between watt-hour efficiency and ampere-hour efficiency?

523. What is the reason for floating a battery in charging?

CHAPTER XXII. Power Plant Principles (Continued).

524. *Plate capacity.*—It is obvious, after a little consideration, that the actual capacity of the negative group of plates in each storage cell must be equal to that of the positive group. Should the capacity of either be less than that of the complementary group, the capacity of the entire cell will, obviously, be limited to that of the weakest plates.

It is standard practice with the manufacturers of storage batteries to make the negative plates of greater surface and bulk, in the aggregate, than the positive plates with which they are to be associated. This is because the negative active material is of lower capacity in watt hours per pound than the positive. In the case of old batteries which have shown indications of deficient capacity, it is sometimes possible to make thorough repairs by the installation of entirely new negatives or entirely new positives as the case may require.

The method of determining the relative capacities of the positive and negative groups in the cell is simple and effective. It is most commonly applied by the use of an independent cathode or negative electrode of cadmium which is immersed in the electrolyte of the cell in which the plates are to be tested.

525. *The cadmium test.*—In testing the capacity of the two elements in the lead-lead storage cell, a stick of the metal cadmium is used. This metal, when immersed in the electrolyte, affords a point of absolute potential. In the storage cell, on the other hand, high-cell voltage may be due to a *difference of potential* caused by loss of capacity in either positive or negative elements or to high internal resistance.

It may also be due, in abnormal conditions of the plates, to an abnormally high positive potential and an improperly high negative potential, in addition to high internal resistance. This is due to the fact that the voltmeter, when applied to the terminals of any storage cell, indicates the *difference* in potential between the plates. Obviously this *difference* may be the same when the potential of both elements is abnormally high or abnormally low.

The cadmium, however, when immersed in the electrolyte, affords a definite starting point from which the actual *electromotive force* of each element may be easily determined.

It is to be noted that the readings obtained with the voltmeter between the cadmium and each of the elements of the battery is the *electromotive force* of that element and is due to the potential chemical energy of the active material as affected by the electrolyte. The reading of the voltmeter applied to the terminals of the cell, on the other hand, is due in part to the electromotive force of the cell and in part to the difference of potential between the elements considered as a part of the conductor carrying the charge or discharge current. See Sections 496 and 497, TELEPHONY'S Home Study Course for Telephone Men, November 7, 1916, for additional discussion of this point.

526. *Method of making cadmium test.*—The method of working in making the cadmium test is as follows:

One terminal of the voltmeter must be placed in contact with the plates in question, and the other with the metallic cadmium, which is then dipped into the electrolyte very near to, but not quite touching the plate.

The test may be applied at any time, but preferably near the end of the ordinary discharge. The reason for this is that the plate which is deficient in capacity will show evidences of that fact more accurately near the end of its discharge than at any other time.

When the test is made, if the reading between the cadmium and the negative element is 0.5 volt or above, the negative element is discharged. That is to say that with the negative terminal of the voltmeter connected to the cadmium and the positive terminal connected to the negative element, it will show a reading of 0.5 volt or over when the negative element is completely discharged. Likewise when the positive element is completely discharged, the cadmium will show a reading of 2.0 volts or less, the cadmium being negative to the positive element.

527. *Range of voltmeter readings in cadmium test.*—The typical range of the voltmeter readings between the cadmium and the positive and negative elements under test throughout the discharge of a normal cell is shown in the table which follows. As an illustration in point, when the cadmium is 0.5 volt negative to the negative element and is 2.50 volts negative to the positive element, the indication is that the negative is completely discharged while the positive is fully charged. Such a condition could be caused by the loss of a large proportion of the active material from the negative plate.

The table of the voltmeter readings between the cadmium and the two elements follows:

Reading between the Cadmium and the Negative Element:	
Discharge starts with the cadmium negative to negative element	0.10 to 0.15 volt
Discharged one-third	0.16 volt
Discharged two-thirds	0.18 volt
Discharged completely	0.30 volt
Reading between the Cadmium and the Positive Element:	
Discharge starts with the cadmium negative to positive element	2.28 volts
Discharged one-third	2.17 volts
Discharged two-thirds	2.15 volts
Discharged completely	2.00 volts

When the normal cell is fully charged and is *not discharging,* the cadmium is negative to the negative element from 0.00 to 0.15 volt. It is negative to the positive element under the same circumstances about 2.50 volts.

528. *Precautions as to use of cadmium test.*—In making use of the cadmium, the utmost care should be taken to insure that its surface is free from the accumulation of bubbles. It should be shaken

from time to time and, when removed from the electrolyte, should be carefully washed to remove the remnants of the adhering electrolyte.

The application of the cadmium test to an old storage battery whose positive plates, for instance, appear to be good but whose capacity is undoubtedly low, will often show that the positive plates

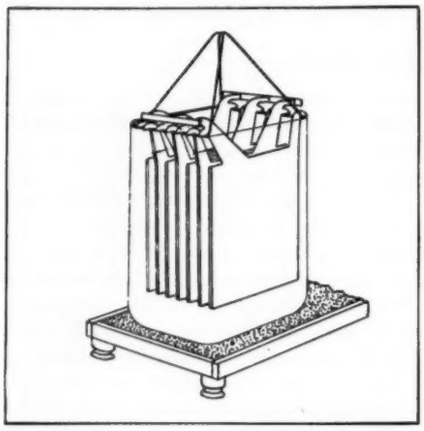


Fig. 174. Method of Using Insulated Wire for Lifting Plates.

are of fair capacity while the negatives are completely gone. The case may, of course, be the reverse. It is sometimes possible to practically renew the life of such a battery by replacing one of the plate groups or elements with new ones.

529. *Importance of pure water and acid.*—It is extremely important that the electrolyte of the storage battery be free from water or acid containing impurities. Distilled water only should be used to replace that lost by evaporation or spraying. It is essential that the purpose to which such water is to be put should be indicated when it is purchased.

This is because distilled water that is perfectly suitable for some uses is not at all suitable for use in storage batteries. For instance, water that is distilled in iron pipes is very apt to contain more or less iron in chemical combination, and iron in even minute quantities is fatal to the long life of the lead-lead storage battery. There is a small water still on the market by means of which each company may, at small expense, produce satisfactory distilled water for battery use on its own premises.

Acid, in the rare case when it must be added to existing batteries, should be purchased through the storage battery company. Acid is never required in the operation of the modern storage battery except when loss has occurred through accident, a broken glass jar, or a leaky tank.

When the electrolyte of the battery becomes weak and its specific gravity does not recover on charge, the remedy is the removal of the improper condition of operation and *not* the addition of fresh acid to the cell.

530. *Cleaning of storage batteries.*—In all storage batteries there is a certain amount of shedding from the active material of the plates. This is bound to occur as a result of normal operation and is not serious unless it becomes excessive.

Space is provided in all commercial storage batteries, at the bottom of the jar or tank, for the harmless accumulation of the loosened material from the plates. Resting on the bottom of the jar or tank, provided it does not reach to within a fraction of an inch of the lower edge of the plates, this sediment will do no harm. In fact, the storage cell is much better left standing quietly as long as possible.

The sediment in the jar, being chemically inert, does no harm until it approaches so closely to the lower edge of the plates as to make an actual or partial contact with them. When this occurs it is likely that a circuit of high resistance may be created between the terminals of the cell through the sediment with a resulting loss of capacity due to the slow discharge. When this condition is present, it is necessary to remove the sediment and free the lower edge of the plates.

The cleaning of a storage cell becomes a very serious and difficult operation when the cell is one of large capacity, contained in a lead-lined tank and having its full complement of plates installed. In lead-lined tanks having less than the full number of plates instaled, the operation is very simple. The writer has never found any method superior to the following for such cases:

Free one arm from *all* clothing (electrolyte is more destructive to cloth than moth) and smear it and the hand thickly with vaseline. Reach boldly down into the electrolyte and scoop up the sediment in the hand. Renew the vaseline coating as often as may be necessary to prevent irritation of the skin. Hot water and strong soap should be easily accessible during the entire procedure, as the soap may be used to *neutralize* the acid of the electrolyte.

In this way, 11 large cells have been cleaned under the writer's supervision, in two hours with very little inconvenience to anyone. Scoop of metal, except aluminum, or scoops with metal nails or screws are not permissible. The acid of the electrolyte would be instantly attacked by any such metals with very injurious effects for the battery.

Scoops made wholly of wood, owing to the small and irregular dimensions of the space in which they must be used, their resultant fragile design, and the great weight of the sediment, are not a success.

531. *Cleaning batteries in glass jars.*—In the case of batteries in glass jars, the same procedure may often be followed. When the jars contain too nearly their full complement of plates to make this possible, it is necessary to disconnect the cells from the circuit, one at a time, and remove the elements.

The plates may be taken from the jar as a unit, positive and negative together, by passing a rope or strong insulated wire (the writer has often used triple jumper wire on *F* size plates) between the glass and the edge of the plates and underneath the lugs that support them on the edge of the jar. This is shown in Fig. 174.

Work of this sort should always be done when the cell is fully charged and the element should be *at once* placed under water or immersed in fresh electrolyte when removed from the jar. If allowed to stand exposed to the air, the surface will become hot, the active material will become oxidized from the air, and the phenomenon known as "air discharge" will take place. Immersion in either water or electrolyte prevents this chemical action by excluding air from the surface of the active material.

An extra jar is most useful and where available may be used as a receptacle containing clean, fresh electrolyte for the plates as soon as they are removed from their jar. In fact, the attempt should *never* be made to clean a battery in glass jars unless one or two extra jars have been provided, as broken jars are almost certain to occur even with most careful work.

By placing the element removed in the new jar filled with fresh, clean electrolyte, the cell may be at once replaced in the circuit. The old jar may then be cleaned and made ready for the elements from the next cell to be disconnected.

Electrolyte in old jars may be saved by the use of a rubber tube siphon which will draw off the clear without disturbing the sediment. The sediment is of no value and may be thrown away.

(To be Continued.)

Telephone Traffic in Sweden Has Outgrown Facilities.

Although the last Riksdag of Sweden increased from four to nearly seven million crowns, the usual appropriation for new telephone lines, the traffic has again caught up with and overtaken the existing facilities, and the officials in charge of telephones and telegraphs are working out a plan calling for the installation of a great number of new trunk lines in the coming year.

The percentage of yearly increase of demands on the lines is steadily growing greater. It was 5.9 per cent. in 1912-1913 and rose to 7.3 the following year, to 7.5 in 1914-1915, and exceeded the last-named figure in 1915-1916. Users of the long distance lines, particularly between Stockholm and Malmo, complain that they frequently have to wait two hours for a clear line.

Induction and Repeating Coils

Action of Induction and Repeating Coils in the Capacity of Step-up Transformers—Equalization of Impedances by Means of Coils—The Bell Common Battery Booster Circuit—Losses in Coils—Methods of Design

By E. W. Kellogg

The telephone induction coil is essentially a transformer. It differs from a power transformer in that it is designed for small currents and high frequencies, and that it must be able to operate efficiently with considerable direct current flowing in one of its windings. Telephone transformers are usually referred to as "induction coils," if they are placed at the subscriber's telephone sets, and as "repeating coils" if placed in cord or trunk circuits.

Functions of Induction Coils and Repeating Coils.

There is no essential difference between an induction coil and a repeating coil, except that a more expensive and efficient coil may be justified in the cord or trunk circuit, since the number of repeating coils required in the exchange is much less than the number of induction coils.

An induction or repeating coil may serve either or both of the following functions:

(1) To produce an alternating current on the secondary side when the primary winding is supplied with a fluctuating unidirectional transmitter current, thus, in a way, separating the alternating from the direct current.

(2) In telephone transmission, exactly as in the case of power transmission, the line loss may be reduced by sending a small current at high potential, rather than a large current at low potential. A transformer is therefore introduced which receives the low potential alternating current from the transmitter, and supplies a smaller current at high potential to the line.

Induction coils for local battery sets are nearly always wound with a larger number of turns on the line side than on the transmitter side. With common battery telephones, it is not so simple a matter to make use of the induction coil at the subscriber's station as a "step-up" transformer. The only common battery set in which the induction coil is used in this capacity is that of the Western Electric Co.

Induction Coils as Step-up Transformers.

The effects of line capacity and line impedance can be accurately determined only by a study of the propagation of electric waves over wires, but a brief explanation will serve to show in a general way what determines the best ratio of transformation.

A part of the current which the transmitter supplies goes to charging the condenser formed by the two parallel wires, and never reaches the receiver at all. The amount of current required to charge the line is directly proportional to the potential. This reasoning is based on the supposition that the line is approximately equivalent to a series resistance with a bridged condenser, which is true of short unloaded lines, less than five or ten miles, depending on the kind of line. With longer lines a more exact theory must be applied, but the same general conclusions hold.

With long distance power transmission where the charging current is small, there is a gain in efficiency of transmission from raising the voltage, until such extremely high potentials are reached that corona losses begin to enter. With the transmission of telephonic currents, on the other hand, the limit of desirable step-up for transmission is very quickly reached. At first there is a gain because of the reduction in line copper loss, but as the potential is raised, the loss due to charging current increases and a point is reached beyond which the loss exceeds the gain. The charging current is proportional to the frequency as well as to the potential, so that if the frequency is high, the potential must be less in order to avoid excessive charging loss.

The best ratio of transformation thus depends upon the frequency of the current transmitted, a lower ratio being favorable to the high frequencies. This is true of unloaded lines in cable. With open wire lines, which have considerable inductance, frequency makes less difference, and in the case of loaded lines, the best ratio of transformation is the same for all frequencies.

The induction coil that will work best is one whose ratio of transformation is such as to give the best transmission for frequencies about mid-way in the range of important telephonic frequencies. The mean frequency is usually taken as about 800. The best ratio is not sharply defined, for the value of energy received holds up fairly well over quite a wide range of ratios of transformation.

Transformation Considered as Equalization of Impedance.

While the idea of stepping up or stepping down the voltage is entirely applicable to telephone work, these phrases are not

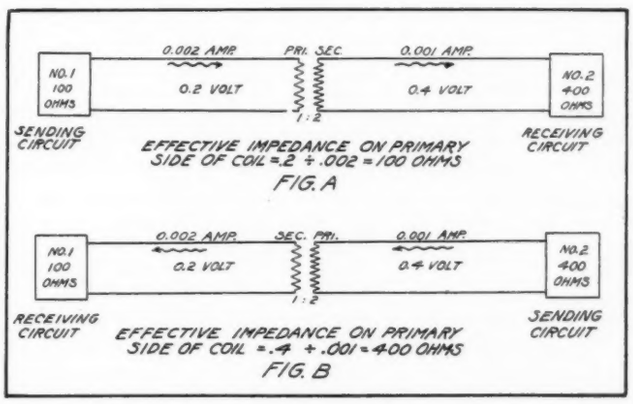


Fig. 1. Equalization of Impedances by Means of Induction Coil.

ordinarily used in telephone language. The function of the transformer is thought of as altering the effective impedance of a circuit, rather than changing the voltage or the current. This custom on the part of telephone engineers follows naturally from the fact that it is impossible to rate telephone apparatus in terms of volts and amperes, whereas impedances are nearly constant and easily determined, and the most favorable ratio of transformation is easily found if the impedances of the two circuits which are to be connected together are known.

Whenever two telephone circuits are connected together for talking purposes, one becomes a sending, or supplying circuit, and the other a receiving circuit. A moment later, when the other party begins talking, the second circuit becomes the source and the first becomes the receiving circuit. Suppose, for example, that the sending circuit has an impedance of 100 ohms, and the receiving circuit 400 ohms, as indicated in Fig. 1-*A*. A transformer with twice as many turns on the secondary winding as on the primary would be used.

Neglecting the losses in the transformer windings, two-tenths of a volt supplied from the sending circuit to the low

side of the transformer, would mean four-tenths of a volt impressed on the 400-ohm receiving circuit. This would send one milliampere into the receiving circuit, and the corresponding current in the low-voltage side of the transformer would be two milliamperes. Thus the sending circuit supplies 0.2 volt

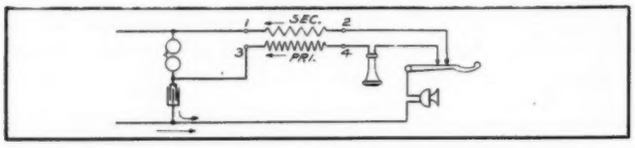


Fig. 2. Circuit of Booster Type of Telephone Set.

and the resulting current is 2 milliamperes, so the impedance offered by the primary winding of the transformer, which is receiving the energy from the 100-ohm circuit, is 100 ohms. The transformer has reduced the effective impedance of the receiving circuit from 400 to 100 ohms.

If the power were being transmitted from circuit No. 2 to circuit No. 1, as shown in Fig. 1-*B*, 0.4 volt impressed on the high-voltage winding of the transformer would cause 0.2 volt to be impressed on the 100-ohm receiving circuit. The resulting current in the receiving circuit would be 2 milliamperes, and the 400-ohm circuit would supply one milliampere to the transformer. If 0.4 volt causes one milliampere to flow, the high-voltage transformer winding presents an impedance of 400 ohms into which the 400-ohm supply circuit sends its current.

Thus, whichever the direction of transmission, the transformer enables the sending circuit to supply its energy to a receiving circuit of the same impedance as its own. In this sense the transformer *equalizes* the impedances.

To equalize any two impedances, the transformer must have a ratio equal to the square root of the ratio of the impedances of the two circuits which are to be connected together.

This principle is applied at many points in telephone circuits. The induction coil in a local battery telephone is designed to reduce the disparity between the line impedance and transmitter resistance. Wherever two lines of widely different impedances are connected together, it is found desirable to employ a re-

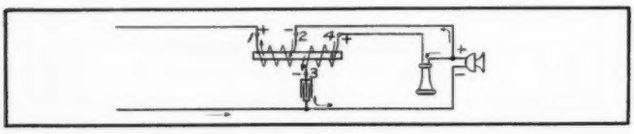


Fig. 3. Simplified Diagram of Booster Circuit.

peating coil with the larger number of turns on the side of the high impedance line. Exact equality of impedance is not aimed at, for the loss due to inequality is inconsiderable except where the difference in impedance is great; even a two to one ratio in impedances does not give rise to a very serious loss. The losses in a transformer neutralize any gain that might be secured from equalizing impedances that differ by small amounts.

Altering Line Impedance in Common Battery System.

An induction coil at the subscriber's station in a common battery system may be used to step up the transmission voltage by so connecting the windings that the alternating current in the transmitter is greater than that in the line. This is done in the case of the Western Electric common battery telephone set, the circuit of which is shown in Figs. 2 and 3.

The terminals, 1 and 4, of the induction coil are of like polarity, i. e., if an instantaneous E. M. F. is impressed on the winding, 4—3, such as to make 4 positive and 3 negative, then 1 becomes the positive terminal of the secondary winding.

Remembering that the direction of current flow is *against* the induced E. M. F. in the primary winding of any transformer, and with the induced E. M. F. in the secondary, we see that if the primary current flows from 4 to 3, the secondary current must flow from 2 to 1, as indicated by the arrows in Figs. 2 and 3. This applies to the instantaneous value of the alternating currents only, since the direct current does not induce any voltage in the windings.

It is noticed that the transmitter current is the sum of the two currents in the windings of the induction coil. In other words, the alternating current produced by the transmitter divides in a definite ratio, a part going to the line and a part flowing through the local circuit comprising the receiver and condenser.

Since the impedance of the line is high, a relatively high E. M. F. is required to send the current through it. Only a small E. M. F. is needed, on the other hand, to send current through the receiver and condenser. Since the transmitter supplies the same voltage to both circuits, the induction coil must act as an equalizer.

The transmitter supplies an E. M. F. greater than that required by the receiver and condenser, and the excess is absorbed by the winding, 3—4, of the induction coil. The winding, 3—4, thus takes in power from the transmitter. Neglecting the losses in the transformer, the winding, 1—2, must put out

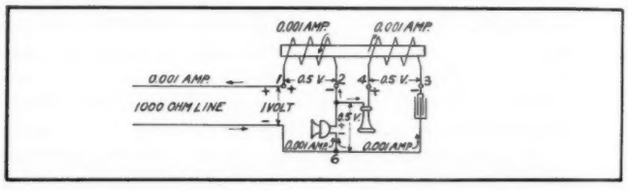


Fig. 4. Illustration of Action of Induction Coil.

an equal amount of power. It does this by assisting the transmitter to supply the line voltage, i. e., by adding its induced E. M. F. to that supplied by the transmitter. This may be illustrated with a simple numerical example.

The impedance of the local circuit, Fig. 4, is taken to be so much lower than that of the line that it may be neglected. Assume a 1 to 1 transformer and a line of 1,000 ohms' impedance. Suppose that the instantaneous E. M. F. of the transmitter is such as to make the point 5 positive to 6, by 500 millivolts. These 500 millivolts are impressed on the winding, 4—3, so as to make 4 positive. Since 1 and 4 are of like polarity, this induces an E. M. F. of 500 millivolts in the winding 1—2, with 1 positive and 2 negative. As 1 is positive to 2, and 5 positive to 6, the E. M. F. induced in the winding, 1—2, adds to that of the transmitter, giving a total of one volt, or double that supplied by the transmitter.

One volt would cause a current of one milliampere in the line. The current in the local circuit would also be one milliampere—the coil ratio being unity—and the transmitter current two milliamperes. The effective impedance at the transmitter terminals would thus be 0.5÷0.002 or 250 ohms. Thus by reducing the line current to half that in the transmitter, the effective line impedance is reduced to one-fourth its former value.

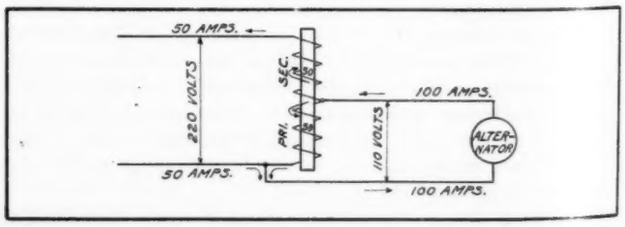


Fig. 5. Auto Transformer Connection, Analogous to Induction Coil Considered.

This is exactly the same effect as that secured by introducing a 2:1 step-up induction coil in a local battery set. The result of reducing the impedance is such an increase in transmitter current output as to make the line current considerably larger than it would be without the induction coil.

The advantage of this stepping-up action is clearly shown by the experience with the "side-tone reduction" connection, shown in Fig. 6. When a telephone is used in a noisy place, this change in the circuit is made in order to render the receiver less sensitive to local noises. The connection for side-tone reduction makes the line current the same as that in the transmitter, and

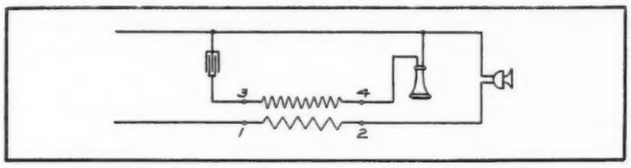


Fig. 6. Connection for Side Tone Reduction.

therefore eliminates the stepping-up effect. The result is a loss in the efficiency of transmission, equivalent to that caused by increasing the line length by 3½ miles of No. 19 gauge cable.

The induction coil commonly used in Western Electric telephones has a ratio of about 1.25:1, with the larger number of turns in the line winding. This would make the transmitter current about 2.25 times that in the line, with a corresponding step-up in voltage.

Series Impedance in Induction Coils.

The losses in induction and repeating coils are similar to those occurring in power transformers. There is the series loss due to the resistance of the windings. There is also a series reactance due to the leakage of lines of magnetic force between the primary and secondary windings. The series reactance may be determined by short-circuiting one winding and then measuring the inductance of the other winding by the bridge method.

It cannot be said that the series reactance introduced by an induction coil is necessarily detrimental to speech transmission. Inductive reactance in series with the line conductors is decidedly beneficial when properly placed, since it can be made to neutralize the effects of line capacity. Located at the terminals of the lines, the inductance may be an advantage or the reverse, according to circuit conditions. It is probably more often of benefit than otherwise.

Magnetizing Current or Leakage in Induction Coils.

The shunt or leakage loss of an induction coil corresponds to the excitation loss of a power transformer. The actual energy loss in the iron is small, but the magnetizing current is frequently a considerable proportion of the useful current or "load current" as it would be called in power work. This is especially true of coils connected across lines of high impedance. For example, the winding of an induction coil in common use, shows an inductance of about 0.4 henry, which corresponds to a reactance of 2,000 ohms at a frequency of 800 periods per second. If the telephone set were connected to a line of 500 ohms' impedance, the magnetizing current of the induction coil would be one-fourth as large as the current sent to the line. At a lower frequency the leakage current would bear a larger ratio to the line current.

The question may be raised as to whether the leakage or magnetizing current represents a loss of efficiency in speech transmission. Except for the small iron loss, it does not waste energy directly, but if it means an additional load on the transmitter, or that the line must carry an excess current during receiving, the effect would be harmful. Magnetizing current does not necessarily mean a useless load on the transmitter, nor current transmitted to the receiving station, only to be wasted. If the line capacity is high, the leakage current may offset the useless charging current in the line.

Whether induction coil magnetizing current represents loss, depends upon the line capacity, the line length, the character and location of other apparatus in the circuit and, finally, upon the frequency of the electric waves being transmitted. Since the frequency enters as a factor, leakage current must inevitably be a cause of more or less distortion.

The reason that the magnetizing current in a telephone transformer is so much larger a proportion of the total current than in a power transformer, is that the latter is built with a complete iron magnetic circuit, and is not required to work with direct current flowing in its windings. If a power transformer is polarized by a comparatively small direct current, the alternating current required to excite it to normal voltage, may rise to a value in excess of the full load current, on account of the saturation of the iron.

Induction coils and repeating coils nearly always carry direct current. If the air gap is large, as in the case of straight core coils, saturation effects are avoided, but the high reluctance of the magnetic circuit, due to the air gap, means large magnetizing current. On the other hand, a toroidal coil, when unpolarized, may show a high inductance which corresponds to a small magnetizing current, but a direct current in the winding, of the magnitude encountered in practice, is likely to reduce the inductance to a half or a quarter of the original value.

If it is desired to design a coil which shall have a minimum leakage under working conditions—i. e., when polarized with a certain amount of direct current—a nearly complete iron circuit would be used, the air gap being just long enough to prevent saturation of the iron. For a given number of turns in the winding, the inductance is directly proportional to the slope of the magnetization curve. The inductance of a coil is given by $\frac{\text{No. Turns}}{(10)^8} \times \frac{d\Phi}{dI}$ in which $\frac{d\Phi}{dI}$ is the change in flux per unit change in current.

For a given voltage at the terminals of the coil, the higher the inductance or the inductive reactance, the less will be the current that leaks across. In Fig. 7 the curve, *A*, shows the relation of flux to current in an induction coil with no air gap in the magnetic circuit. If an air gap is introduced, an additional magnetomotive force is required, directly proportional to the flux, as indicated by the curve, *B*.

To send a given flux through both the iron and the air gap with require a magnetomotive force equal to the sum of those required for the iron and air individually. Thus curve *C*, which is obtained by adding *A* and *B*, shows the relation between flux and current for the coil with the air gap. *O—F* indicates the maximum direct current which the coil is expected to have

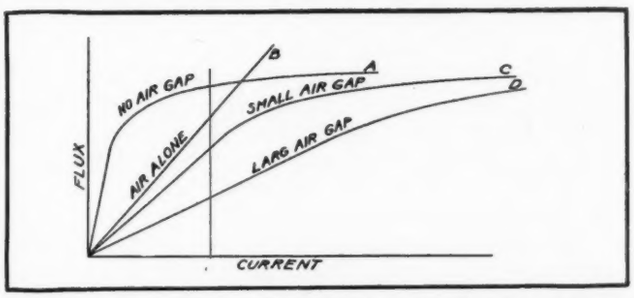


Fig. 7. Magnetization Curves Showing Effect of Air Gap on Coil's Inductance.

to carry, and it is the steepness of the magnetization curve directly over the point, *F*, that indicates the inductance.

It is seen that with this amount of polarizing current, the curve *C* is steeper than the curve *A*. In other words, the introduction of the air gap has steepened the magnetization curve, or increased the change in flux resulting from a small change in current, and this means high inductance or small leakage.

Any further increase in the air gap would reduce the slope of the magnetization curve again, as indicated in curve *D*, and would lower the inductance.

It has not been customary to build coils of small air gaps, following the idea of this theory, but rather to adhere to the types using complete iron magnetic circuits, or else straight cores. This is probably done principally because it has appeared cheaper, where high inductance was thought necessary, to secure the increased inductance by adding turns to the winding, and then keeping the resistance of the windings down by using larger wire.

Induction Coil Design.

In the earlier stages of the telephone art, the manufacturer would select the type of induction coil to use for any particular purpose, by building a number of coils of various proportions, and comparing them in actual talking tests, in the circuits for which they were intended. This method of design has not been altogether superseded, although some principles of rational design have been established. The talking test must always remain the ultimate criterion of efficiency, and there is little expense involved in making up a few experimental coils.

The procedure in designing induction coils or repeating coils is about as follows:

The type of coil, whether toroidal or straight-core, is determined by the nature of the service for which the coil is intended, the general practice of the manufacturing company, the permissible expense, available space, and desired efficiency.

The ratio is usually fixed by the ratio of impedances of the two circuits between which the coil is to be placed, the best coil ratio being equal to the square root of the impedance ratio. The impedances of the circuits cannot always be definitely stated, for if the coil is intended for a stock article, it will be used in many places. The best that can then be done is to estimate average impedances of circuits of the type in question. In calculating the circuit impedance, which depends on the frequency, a mean value of frequency of about 800 periods per second, is used. In special cases, other considerations than the impedance ratio may enter in determining the ratio of transformation.

After the type of coil and ratio have been decided, a convenient size of core is selected for trial. This practically fixes the winding space, for there is a certain depth of winding which will result in a coil of good proportions and economical design. Various sizes of wire are tried for the primary and secondary windings. The wire size and the available space determines the number of turns that can be put on.

An estimate is then made of the properties of each coil from the speech transmission standpoint, and of the cost of manufacturing it. Experience with other coils of similar size and proportions enables the designer to predict the self-induction and mutual inductance of the windings, (for a given winding space, the inductance varies as the square of the number of turns in the winding), and to compare the several designs in regard to leakage losses.

The series losses may be compared from the calculated resistances of the windings. The reduction in transmitter output resulting from introducing resistance in series with the battery supply must be taken into account, as well as energy lost by the passage of the high-frequency currents through the winding resistance. It is customary to reduce all losses to the same units, in order that the totals may be compared. The unit employed is a "mile of transmission" or the loss which occurs in one mile of standard cable.

After the best coil which can be built on a given core has been determined, other sizes of cores are tried. Several of the designs which appear most promising from the calculations, may be built and compared by actual talking tests as a check.

The final selection of the design to be adopted rests on considerations of both cost and efficiency. It is possible in many cases to set an actual monetary value on the saving of a mile of transmission. This is possible because in any long distance telephone connection, there are numerous points at which an improvement in transmission can be effected by the expenditure of money. The maximum justifiable expense for increased efficiency in an induction coil, is the amount which could purchase an equal improvement by some other means.

Telephone Float in Coos Bay Railroad Jubilee.

The float of the Coos & Curry Telephone Co., of Marshfield, Ore., shown in the accompanying illustration, attracted considerable attention in the parade at the Coos Bay Railroad Jubilee, recently held in celebration of the opening of the Southern Pacific Railroad from Eugene to Marshfield. The map carried in the float shows what is generally known as the Coos Bay country, which is served

An Effective Form of Telephone Publicity.

entirely by the Coos & Curry Telephone Co., with connections for long distance traffic with the Pacific Telephone & Telegraph Co. at Myrtle Point and Gardiner. Gold Beach, at the mouth of the Rogue River, and Scottsburg, at the head of navigation on the Umpqua River—some 150 miles apart—mark the extreme points served by the Coos & Curry company.

The man to the left of the float is Charles Hall, president of the Coos & Curry Telephone Co., with his daughter, Miss Cynthia. In the back of the car, to the right of the map, is Earl W. Gates, plant superintendent.

The opening of this railroad is the most important piece of new railroad construction built in the United States during the past three years. The new road is 125 miles from Eugene to Marshfield on Coos Bay, which is the most important harbor on the Pacific coast between San Francisco and Portland. On account of recent improvements at the entrance to the harbor, it now has deeper water on the bar than any Pacific coast port except Puget Sound. Prior to the opening of the railroad, Marshfield enjoyed the rather doubtful distinction of being the largest city in the United States without railroad connection with the rest of the country. This honor has now been passed on.

The stimulation of business in general, as a result of the opening of the railroad, is making the telephone business in that territory better than it has ever been before. Still better things are expected with the revival of the lumber business, which is the largest industry in this country. There are also extensive deposits of coal and other minerals in the Coos Bay country and Coos county stands third in dairy products on the Pacific coast.

Fundamental Principles of the Telephone Business

A Reading Course Designed to Present Logically the Principles Which Underlie Successful Organization and Operation of Telephone Properties—Prepared Under the General Supervision of Stanley R. Edwards—Part I, Telephone Economics, by James H. Shoemaker, Completed June 26, 1915—Part II, The Corporate Telephone Organization, by J. C. Kelsey and S. R. Edwards, Completed September 25, 1915—Part III, Telephone Accounting and Auditing, by James H. Shoemaker, Completed January 15, 1916—Part IV, Telephone Finance, by J. C. Kelsey and S. R. Edwards, Completed June 3, 1916—Installments Now Being Presented Comprise Part V, Telephone Advertising and Publicity, Written by Roy D. Mock

Quiz Questions on the Preceding Installment.

117. What criticism may be made of the advertisement which is reproduced in Fig. 101?

118. Why should advertising be resorted to before application is filed with the public utilities commission for an increase in rates?

119. How did the Missouri & Kansas Telephone Co. state its case to the people of Hutchinson, Kan.?

120. To what phase of advertising are the Bell companies devoting considerable attention and what matters are considered?

121. What class of the public is it especially desirable to educate as to the use of the telephone?

CHAPTER X. Publicity Methods and Ideas.

122. *Dividing Line Between Publicity and Advertising.*—The old way of showing the difference between advertising and publicity was based on whether or not it was paid for. If it was paid for, it was advertising. If it was not paid for, it was publicity. But this method of deciding the difference will no longer hold, because a great deal of publicity is now paid for whereas some advertising is not.

Publicity is a wheel within a wheel. All publicity is advertising, but not all advertising is publicity. Advertising goes out with the avowed purpose of selling merchandise or service or some one thing for the benefit of the company which issues it. Publicity works in a more subtle way.

For the most part, publicity takes the form of reading notices in newspapers, exhibits at fairs, conventions, etc., also lectures, year books, etc. Paid newspaper space which is devoted to telling how much bigger one company is than the other is advertising. There is no question about that. But if two telephone instruments are manufactured, one six feet tall and the other four feet tall to show the relative sizes of two telephone companies, and if these two instruments are hauled around town in an automobile so every one can see them—then that is publicity.

123. *Newspaper Publicity.*—Almost any newspaper is willing to take a certain amount of reading matter and run it free, particularly if the concern which proffers it is a regular advertiser. In order to be of value, such reading notices should be timely and newsy, for, like an advertisement, a reading notice is useless unless it is read and understood.

If instances of real news value happen in connection with a telephone company, any newspaper will be very glad to print them, and it will furnish good publicity for the telephone company.

Elections of officers should be reported. Promotions, changes or additions to the staff should be recorded. Any new equipment which is installed can be made the basis of a very interesting article, provided the story tells clearly and simply just what are the advantages of the new equipment.

Articles with names of people in them make the best reading notices.

124. *Publicity Through Fairs, Shows, Exhibits and Parks.*—Exhibits at various conventions, fairs, bazaars, etc., are always valuable, because the telephone company should lose no opportunity to interest the public in its achievements and the work which makes them possible. The Johnstown Telephone Co. made a very interesting display at an industrial show held at Johnstown, Pa., and its appearance is shown in Fig. 104. The central point on the map naturally symbolized Johnstown, while the other points to which wide black lines radiated, represented the long distance connections that could very easily be made from any telephone in Johnstown.

In the center of each one of the radiat-

Fig. 104. Publicity Display, Electrically Operated, of the Johnstown Telephone Co.

ing lines was a copper wire with gaps in it, the wire being invisible except to those within five feet of it. The entire apparatus was connected to a spark coil, and quite a spectacular display was made as the sparks jumped the gaps in the radiating wires. The bells at the bottom of the map also added to the display, as they were rung at intervals by a central office operator. A full description of this exhibit appeared in TELEPHONY of March 4, 1916.

Fig. 105. Exhibit at Electrical Show at Erie, Pa.

An exhibit of the Union Telephone Co. at the Erie, Pa., electrical show, as shown in Fig. 105, also proved very interesting. This exhibit was designed to show how long distance telephone calls are routed, and clearly revealed the number of different connections that must oft-times be made in completing long distance calls.

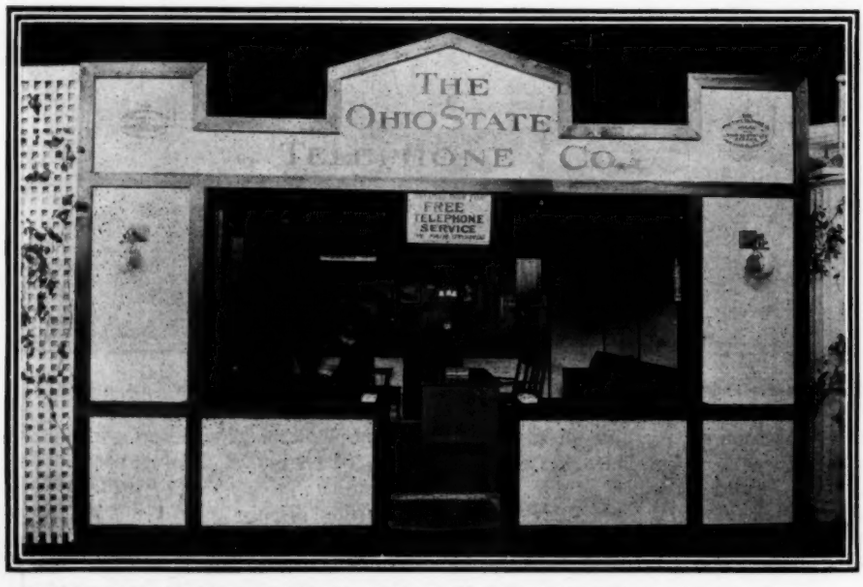


Fig. 106. County Fair Exhibit of Ohio State Telephone Co. at Canton, Ohio.

Callers were permitted to suggest certain long distance telephone calls, which were then routed through, a small red light appearing at the stations in the cities along the way. Such an exhibit possessed the advantage of convincing callers that, in spite of apparent delays, "Central" is usually on the job.

It is needless to say that the more interesting and instructive an exhibit can be made, the greater its advertising value.

In Fig. 106 is reproduced a photograph of the booth of the Ohio State Telephone Co. at the Stark county fair held at Canton, Ohio. Adelbert Graham, general manager of the company at Canton, did some very good work in designing this exhibit. It was in the manufacturers' building, and from it free service was rendered to all parts of the fair grounds as well as to the Canton city exchange. The four trunk lines between the booth and the main exchange were kept busy almost constantly.

The fair was held on four days and three evenings, with an average daily attendance of 20,000 people. Consequently the publicity secured by such an exhibit was well worth trying for.

A unique method of securing publicity is shown in Fig. 107. It presents a novel way used to bring the automatic telephone to the attention of the citizens of Portland, Ore., the occasion being a street parade. J. B. Middleton, manager of the Home Telephone & Telegraph Co., states that this big animated telephone made a great hit.

Several telephone companies have made use of signs which were placed on wagons or automobiles used by the telephone company. In order to get publicity in this manner, it is not enough that the name of the company be merely painted on the wagon or automobile in the usual manner, as that is so ordinary it attracts no attention. It should be painted on a muslin sign, which looks more unusual.

This idea can be used to announce the going to press of the new telephone directory or to further interest in some new subscribers' contest that may be conducted. Like all publicity, it should have an unusual and somewhat spectacular appeal.

Fig. 107. Unique Publicity in Portland.

An interesting float is shown in Fig. 108. This float was used in a Fourth of July parade at Bryan, Ohio, the Williams County Telephone Co. being the exhibitor. F. W. White, the assistant general manager of the company, reports that this float took first prize and with it the honor of heading the parade.

An exhibit of this same company at the Williams county fair is illustrated in Fig. 109. Both local and long distance telephone calls were handled from the grounds and considerable interest as to the company's system and its operation was created.

(To be Continued.)

[EDITOR'S NOTE: As the series on

"Telephone Advertising and Publicity" is drawing to a close, there may be questions which some of TELEPHONY's readers desire to ask. Should any wish to submit questions arising as a result of the presentation of this series, the author will be glad to answer them, either personally by letter or through the columns of TELEPHONY.]

Subjects to Be Discussed at Canadian Convention.

An interesting program is being prepared for the eleventh annual convention of the Canadian Independent Telephone Association, to be held in the city hall, Toronto, Ontario, on November 22 and 23. Subjects of interest to all telephone men will be discussed by able speakers of practical experience.

Following are a number of topics scheduled for discussion:

"Compensation as a Penalty for Competition." This refers to the order of the Dominion Railway Board which requires Independent systems competing locally with the Bell, as a condition of obtaining a long distance connection, to pay that company in addition to the regular long distance toll, a surcharge of 7 cents and an annual payment of from $100 to $500 per annum as compensation for alleged loss to the Bell company arising from local competition.

"Should the Dominion Railway Board have authority to order local Bell connection and regulate the surcharges made by that company?" At the present time Independent companies not operating their own switchboards have no alternative but to accept Bell terms for local connection and switching charges, as the Dominion Railway Board's jurisdiction is limited to the ordering of long distance connection only. The existing dominion legislation contains no provision compelling the Bell to give local connections and this discussion will deal with this question.

"Other Line Charges." This discussion will deal with the desirability or otherwise of local and rural systems charging "other line" or terminal fees on incoming messages from other systems where they terminate on local and rural party lines, the use of which is covered by a rental and where no toll line is used by the terminating company.

"Some Hints on the Maintenance of Telephone Equipment."

"The Incorporation of Telephone Systems Under the Ontario Companies Act." Recent legislation requires all telephone systems owned by five or more persons to take out a charter of incorporation. This address will be instructive and will deal with the method of procedure in regard to applying for and securing letters patent of incorporation.

"The Organization of Telephone Systems by Municipalities." This discussion will deal with the necessary procedure for the organization of telephone systems under part 2 of the Ontario telephone act.

"Municipal Telephone Accounting." This will suggest proper methods of accounting to be used by municipalities which have established systems under part 2 of the Ontario telephone act.

"Co-operative Long Distance Messages among Independent Systems." This refers to a proposed scheme for direct interchange of messages between adjacent Independent systems, which will eliminate the necessity of using circuitous connection via the Bell long distance lines.

Fig. 109. Tent Exhibit in Ohio at Williams County Fair.

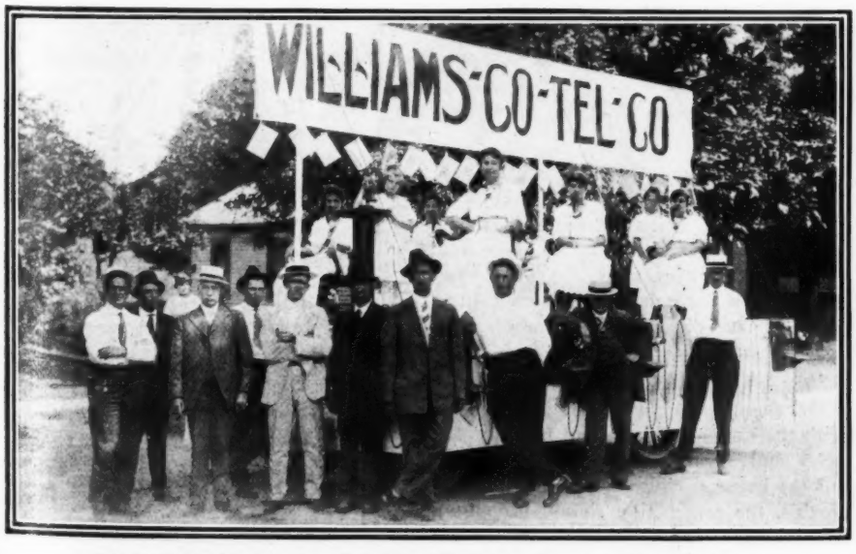


Fig. 108. Telephone Float in Fourth of July Parade at Bryan, Ohio.

Meeting of Southern Indiana Independent Telephone Owners.

The Southern Indiana Independent Telephone Owners' Association has called a meeting to be held at Huntingburg on Tuesday, November 21. The Dubois County Telephone Co. will be host to the delegates and a strong bid for a large attendance is being made. Programs of the meeting mailed out were followed by post cards a week in advance of the meeting in order to remind the delegates of it.

Entertainment will be provided "for members arriving early" and it is urged that all comers bring applicants for membership, in person, to the assembly.

Addresses of welcome are to be made by city officials and a response will be given by M. F. Hosea, of Indianapolis. S. M. Heller, of Louisville, general manager of the Central Home Telephone & Telegraph Co., will give an address on "The Importance to the Local Company of Long Distance Business." A member of the Indiana Public Service Commission will be present and speak on the subject of "Reasonable Telephone Rates," and round table discussions are to be provided for.

I. S. Isom is president of the association and L. C. Griffitts, secretary.

Practical Subjects—Discussions

Side Tones from the Telephone Transmitter on the Front.

By Well Clay.

Walking up the graveled path, bordered with rows of the good old-fashioned flowers that we used to see at Grandmother's in the long ago, the thing that impressed the senses was the air of good comfort that pervaded the place.

The porch was nicely painted as to its floor; the house was painted white, as befitted a cottage in a setting of evergreens and maples; the screens were in good order and shone with shiny black paint. The floor of the kitchen was painted with the durable yellow that custom dictates in this neighborhood, and the living or dining room floor was the same.

The walls were painted a pleasing shade of blue and the whole place looked spic and span, although there was not a single article of furniture in the place that could be called expensive or up-to-date. Most of it was old and the very chairs had been painted a good coat of white. A canary was hopping cheerily about in a cage by the window and the cat was there, asleep, to complete the picture of contentment and plenty.

The opening of the door to our knock let out a whiff of spicy odor which our reliable sense of smell told us was not unrelated to the process of baking gingerbread (How long since you had any that tasted like it used to?), and the lady of the house, who answered our summons, was the kind of a party one would expect—cheerful, rosy cheeked, small of stature, large of apron, active; a chatty-looking little person.

She answered our queries regarding the condition of the telephone in the affirmative—said it had been out of order off and on for a long while. Sometimes it would work all right for a while and then again it wouldn't. She couldn't make out what was wrong and "Jim" (her husband) "couldn't either." New batteries were of no avail because "Jim he put in a pair of 'strong ones' off the engine and it didn't work no different afterwards."

We told her we would look at the telephone and see if we could find the trouble. She hoped we would, as they liked to have it in order in case of sickness or accident—as if there could be any sickness in such a sanitary, cozy little home, or any accidents either, unless it might be to that big slab of hot gingerbread, if she didn't watch us too close.

You will wonder what all this paint, and still more paint, has to do with what ailed the telephone and what I am driving at anyhow. But I am coming to that:

We tested the telephone and found the line partially "short," so after carefully inspecting the inside of the instrument and the carbon button above to see if anything were wrong, we went outside and traced the drop along around two sides of the house to the place where it "jumped off" to the pole. Everything looked all right, except that the wires were coated thickly with paint which had, of course, dried hard onto the wires and in places cracked or checked the insulation. It looked all right, however, and there appeared no evidence that the line was short.

We next cut the wire at the pole and, testing to the office, found an absolutely clear line in that direction. We rang in to the house and were promptly answered by the gingerbread architect who said she could hear us fine. Finally we hooked the line up again and told central to ring us. She could not, although she could ring the bell on the test set at the pole when the line was cut off.

Suspicion pointed at the paint soaked drop along the side of the house and it proved to be the trouble, for as soon as we rewired the station from the pole in, everything was all right. The paint soaked drop which we took off cracked very easily and the rubber disintegrated almost at a touch, which is unusual for drop wire only in service a couple of years as this had been.

To tack the wire loosely along the house so that it cannot be painted might take care of that part of it; but it looks slovenly and the constant swaying of the dangling loops would soon break the wire at the point of fastening. Some other way must be arranged for those houses where wire must necessarily be fastened to the sides in order to reach the desired location. One cannot bore straight through and run the wires inside, as such an arrangement would be in the way of the occupants.

It seems to me that the only course would be to use lead-covered drop wire from the pole underground and let the subscriber pay for it, the same as he now pays for the poles from the main road which in the early days of rural telephone practice were given to him gratis.

It seems the only way out and it is the opinion of many telephone men that hereafter the patron, upon being connected with the line, should pay not only for the poles and wires from the main line but for the house wiring as well. In addition to this, the proposition should be put up to him on a plan to charge him for his telephone and its upkeep, as an electric light company does its meters, and so much for the service—say, $3 a year for his telephone, including the upkeep, and $15 a year for the telephone service. If this does not seem to be allocated correctly, then make it $10 and $8 or $12 and $6 as the case may be. We must, all of us, get the additional revenues necessary to meet the additional expenses which the war has forced on us. If we are pulling even now, we must have made a pile before.

APHORISM: Every action requires force and creates opposition.

P. S.: We got some of the gingerbread.

Aiding the Subscriber to Keep His Directory Up to Date.

Seeing the list of new subscribers to a telephone company as given in Fig. 95, page 24, TELEPHONY of November 4, a thought occurred to me for use in connection with the list.

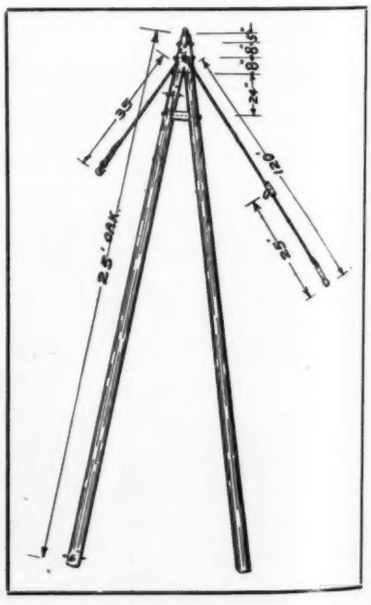
Why not bind in every directory a gummed slip to which may be attached the supplementary lists of subscribers clipped from the newspaper in which they are published from time to time? Space might be allowed at one side of the published list bearing a suggestion such as: "Stick this list to the gummed leaf of your telephone directory." It would thus be easy for the subscriber to keep his directory up-to-date.

R. S. Meek.

Saskatoon, Sask., Can.

The Use of an "A" Gin Pole in Raising Poles.

An "A" type gin pole was used to good advantage in raising poles during the construction of a pole in West Virginia by the Chesapeake & Potomac Telephone Co.



Construction Details of Gin Pole.

It was particularly useful where the ground was covered with big rocks, thus making the footing bad for men piking poles. It not only made it easier but safer to raise the poles, as the tackle was

rigged so as to let the men get on good footing while pulling on the rope.

The pole was designed by W. A. Soyez and a description of it appeared in The Transmitter. The "A" frame was built of two 25-foot straight oak saplings, six inches in diameter at the butt. The heads were fitted and bolted together, a piece of wood 4 by 4 by 10 ins. being put over the lower bolt to keep the poles spread so the butts were about eight feet apart. A loop of strand was placed at the head and held by the first bolt for use in dragging the frame from place to place.

A piece of heavy chain, three links long, was placed between the heads, and the second bolt placed through the center link, so that there was a link hanging on each side of the frame to which to attach the strand. On one side is attached 35 feet of 6,000-pound strand with a hook fastened on the end of it. On the other side is attached 120 feet of 6,000-pound strand with a loop at the end of it, and an extra loop attached at 25 feet from the end.

To use it, attach the blocks to the butt of the next pole (or to any firm anchorage) and lay the new pole with the butt at the hole and the top directly away from the anchorage. Then set the "A" frame just back of the hole, attach the long strand to the blocks and fasten the short strand. Attach to the top of the pole by passing the strand once or twice around the pole and then hooking it around the strand. Attach ropes for sideguys to the top of the new pole, but never sideguy the "A" frame. A good team of horses pulling on the end of the fall line will do the rest.

At the start, the "A" frame will be leaning over the pole lying on the ground. As the top of the frame is drawn back, the top of the pole will be raised until the pole drops into the hole.

If the new pole is a very high one and the anchorage of the blocks is some distance away, the top of the "A" frame may be carried toward the anchorage before the pole is entirely up. But then the "A" frame simply drags over toward the anchorage, the pole being up high enough so that the two pieces of strand are in line and the frame is no longer needed. This device has proved to be very satisfactory.

Use of Block Type Storage Batteries on Rural Telephones.

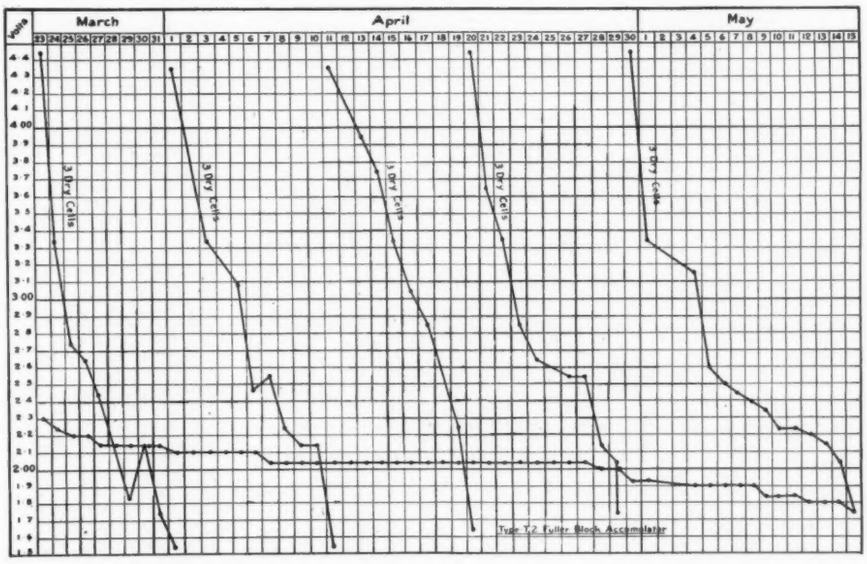
Some recent experiments have been conducted for the purpose of ascertaining the efficiency of the block type storage battery when used in the magneto telephone. The general practice has been to use three dry cells in the transmitter circuit of the telephone, the life of these batteries averaging about one year. It is also customary to change them at least once a year.

The type of storage battery selected was the Fuller block type accumulator, single element, having a normal charging rate of 1½ amperes. These batteries when first made were encased in celluloid, but it was found that the celluloid was affected by acid, when spilled on the casing.

Experiments were tried with rubber cases. Finally a lead case was decided upon, the battery being sealed with compound in the same manner as the dry battery, with the exception that a small vent hole is left for the gases to escape. The battery occupies the same space in the telephone set as the dry cells.

A comparative test was made over a period of 55 consecutive days. For the test three cells of dry battery were placed in series with an induction coil and transmitter, thus continuously completing the normal circuit of a telephone instrument during the test period.

These tests showed that the storage battery would outlast five sets of three dry cells, each set of dry cells lasting practically ten days, and having a voltage at the beginning of the test of 4.4, and ending at 1.6. The storage battery had a voltage at the beginning of the test of 2.3, and maintained its voltage until the 30th day above two volts, finally ending on the 55th day at 1.7 volts. The dry cells have an ampere-hour capacity of approximately 20.6, and the storage battery of 70 ampere hours.



Results of Comparative Tests of Dry Cells and Fuller Block Type Accumulator.

During this test, transmission, the first day, on the dry cells was superior to that of the storage battery, but on the third or fourth day, the transmission with the storage cell was superior. The storage cell maintained normal transmission throughout the period, whereas with the dry cells, transmission would be nil on the tenth day.

The cost of the five sets of dry cells is approximately $3.75, and the cost of the

United States Independent Telephone Association

December 5-6-7-8, Hotel La Salle, Chicago

Sixty Manufacturers' Exhibits Four Afternoons of Interesting Programs

Plant, Commercial, Traffic, and Accounting Discussions

storage cell, substituted in place thereof, is approximately $2.10. At the end of the period, the storage battery is just as good as new, and can be electrically recharged at a cost of less than ten cents.

From these tests it would seem that a storage cell of this type would last out on a telephone instrument for a period of two years without recharging, under normal conditions, and at the same time be maintaining its voltage at two volts. During that period the transmission would be uniform and thus materially improved.

The storage batteries used in this way have some peculiarities. It has been found necessary to take special measures to prevent creeping of the acids at the positive pole in the battery. To overcome this defect, a pocket of vaseline surrounds the positive pole just below the terminal, and is enclosed in a small piece of fiber tubing.

It has been found that these batteries are practically fool-proof, inasmuch as they may be short-circuited without harm to the blocks. Even if the charge is reversed in them, no permanent defect results, as they can be restored to their normal condition by recharging in the proper direction.

These batteries have been tried out in actual practice. Many of them have now been in use more than one year under actual conditions of service and are still maintaining their voltage above two volts.

The batteries are guaranteed to last eight years and can be maintained for ten cents per battery per annum, which includes charging but not the shipping charges.

The weights are as follows: Lead container, 3 lbs.; elements, 4 lbs.; electrolyte, 1½ lbs., and sundries, ½ lb. The total weight complete is 9 lbs.

Other data are: Charging rate, 1½ amperes for 60 hours; normal discharge, ¾ ampere; capacity, 100 watt hours.

H. E. Brockwell.

Winnipeg, Man., Can.

Some Don'ts to Insure Efficient Telephone Service.

In a recent issue of Telephone Topics is given the following list of don'ts for the telephone subscriber:

Don't place a wet umbrella, raincoat or rubbers near the telephone.

Don't allow painters to wash ceilings without first protecting the telephone.

Don't keep water near the telephone.

Don't place the telephone near a window during stormy weather.

Don't place the telephone where the cords will come in contact with the escape valve on a radiator.

Don't slam the receiver onto the hook.

Don't put a cuspidor on the same side of a desk as that which is occupied by the telephone—the desk stand cord may fall into it.

Don't place the telephone near any object on which the receiver may rest while on the hook.

Don't place the telephone in a position on a desk where it is in danger of being knocked off.

Don't let cords drag on the floor so that they will trip anybody.

Don't expect to hear the bell ring with the door closed and you in the next room or out in the corridor—get an extension bell.

Don't remove wire attachments from the water pipe—call the wire chief to have such work done.

Don't try to change the tone of bells by stuffing paper or other materials under them—call the wire chief and report your trouble.

Don't place foreign attachments on the telephone—many of them cause trouble.

Don't use cords for a pin-cushion or pen-wiper.

Don't put pins, toothpicks, buttons or defective coins, etc., in coin slots.

Extensions in Rural Districts Meet Approval of Public.

In a recent issue of The Skillings Mining Review, published at Duluth, Minn., the Zenith Telephone Co., of Duluth, is commended for its enterprise in extending its service into the territory north of Duluth. The company is making some 25 miles of extension this fall into the territory covered by the Howard Gnesen, Rice Lake, Beyer, Delinski (Shultz), Dotke, Fish Lake and other roads.

"The Zenith Telephone Co.," the Mining paper states, "will discover that this attention to the outlying territory will bring it much increased popularity in the city itself, for many Duluth people have farms and summer homes and will appreciate the opportunity for service. The company evidently is not afraid to do a little pioneering, and next to good roads and a trolley service, the telephone is most important to the territory described."

Meeting of Ohio Automatic Association in December.

The regular annual meeting of the Ohio Automatic Telephone Association, to which all automatic operating organizations are invited to send representatives, will be held early in December at the factory of the Automatic Electric Co. in Chicago. While the details of the meeting are still in the hands of the committee in charge, the sessions will occur at the same time as, but so arranged as not to conflict with, the convention of the United States Independent Telephone Association which is scheduled for December 5, 6, 7 and 8.

The program, too, is still unfinished as to details, but the following outline includes some of the more important questions that will be considered:

"New Development in Automatic Telephony," which will deal with the latest advance made in all branches of the art.

"Rural Telephone Networks" will bring up the very important matter of giving first-class service to rural subscribers.

"Recent Developments in Private Automatic Exchanges," with special reference to long distance transmission and traffic standards.

"Latest Developments in Operating Methods," dealing with the use of girls for routine inspections and the extension of systematic routine inspections to the subscribers' equipment.

"The Selling of Automatic Telephone Service," a paper dealing with a very important and interesting subject and having special reference to recent campaigns.

As will be seen from this brief outline, the program promises to bring up matters of very general interest and value, the aim having been to include material of direct benefit to all who attend.

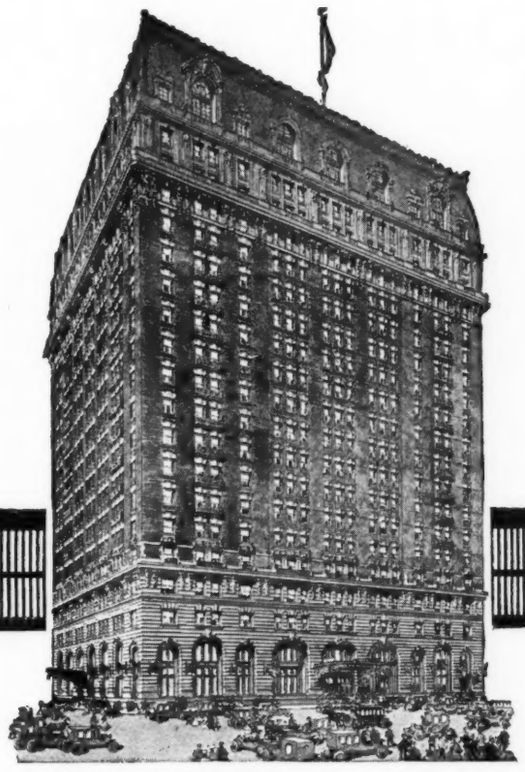
The sessions last year were very generally attended, and were a most substantial success. Present indications point to an even more representative attendance, and the committee in charge has every confidnce that the 1916 meeting will set a new standard of helpfulness in this most unique co-operation plan, which has gone far toward welding the entire automatic field into a unified whole, every part of which aids and draws assistance from all the other units.

Southern States District Meeting to Be Held in Paducah.

Preparations are being made at Paducah, Ky., under direction of B. Y. Chambers, district manager for the Central Home Telephone & Telegraph Co., for two telephone meetings. The first, to be held on Friday, November 24, will be a district meeting of the Southern States Independent Telephone Association, and the second, to be held on Saturday, November 25, will be a district operators' meeting.

The first meeting is in accordance with the plan formed at the annual meeting of the Southern States association to hold three district meetings between then and the date of the annual meeting, to take place in Louisville in May. After the Paducah meeting, others will be held, in Tennessee and in North Carolina. S. M. Heller, of Louisville, president of the association; J. C. Duncan, vice-president, of Knoxville, Tenn.; Terry W. Allen, director, of Jackson, Tenn., and other officers of the association will be in attendance.

The Central Home men who will be present at this session will stay over for the district meeting of the operators. This will be in charge of Warren Paine, assistant superintendent of the Central Home company.



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Hotels, like individuals, build fame on Character.

The character of Hotel La Salle is built on high ideals, rigidly maintained. Its system omits no detail which promotes the welfare and pleasure of the guest.

HOTEL LA SALLE has been selected as headquarters for the next annual convention of the UNITED STATES INDEPENDENT TELEPHONE ASSOCIATION, December 5, 6, 7 and 8, 1916.

SPECIAL RATES TO DELEGATES AND VISITORS:

One Person	Per Day
Room with detached bath,	$1.50, $2.00 and $2.50
Room with private bath,	$2.50, $3.00, $3.50 and $4.00
Two Persons	**Per Day**
Room with detached bath,	$3.00, $3.50 and $4.00
Room with private bath—	
Double room	$5.00 to $8.00
Single room with double bed	$4.00, $4.50 and $5.00
Two Connecting Rooms with Bath—	
Two persons	$5.00 to $ 8.00
Three persons	6.00 to 9.00
Four persons	7.00 to 12.00

Hotel La Salle

Ernest J. Stevens, Vice-Pres't & Mgr.
La Salle at Madison St.

Unusual Traffic Load Fails to Bother the Automatic.

Every once in a while some one has a brilliant thought which brings him very great advantage, but which imposes some unexpected strain upon a public utility. Such an incident occurred recently in Havana, Cuba, whose automatic telephone system, normally carrying far above the traffic usual in this country, was called upon to handle a very much greater load.

A certain Havana weekly publication. called "Confetti," offered a prize of $100 to the person—man or woman—in Havana who would call up on the telephone a particular number, which was not revealed, of course, and say "Confetti has to be seen with glasses."

It was a clever idea, and "took" at once. Literally hundreds of young men and women went industriously to work spinning the dial and calling systematically all the numbers in the directory. On the designated day the phrase "Confetti has to be seen with glasses" was heard on all sides; it became a by-word over night, and great was the gain of the publisher of "Confetti." He had put his paper "on the map" in Havana.

The flood of calls failed to bother the automatic, however, for the mechanical switches went right on working unconfused by the sudden rush and no harm was done.

The Use of the Telephone in Dispatching Tugs.

The value of equipping tugs engaged in harbor service with telephones is being realized by several of the larger railroads of this country. The Baltimore & Ohio Railroad has installed a telephone instrument in the pilot house of every one of its boats used in New York harbor service.

As soon as the tug ties up to one of the company's piers, a deck hand jumps ashore and inserts a plug in a receptacle provided for that purpose. This connection puts the tug captain in communication with the switchboard in the general offices of the B. & O., from whence he can make any call he desires.

Prior to the adoption of the tug telephone system it was necessary for the captain to send a deck hand to the pier office—located at the land end of the pier—to get instructions as to what he was to do next. With the use of the telephone the entire operation takes but a few seconds, and the tug captain can talk direct to the tug dispatcher at the St. George terminal.

A tug telephone system is being installed by the Lehigh Valley Railroad for the use of its tugs also engaged in New York harbor service. When a tug touches at one of the company's piers, the captain will thus be enabled, without leaving his place in the pilot house, to communicate with the tug dispatcher at Jersey City, reporting his arrival and receive further instructions.

To make this possible, cut-in boxes are being placed on the ends of each of the Lehigh Valley piers in New York, Brooklyn, Jersey City and the Bronx and the tugs are being equipped with the necessary apparatus.

The use of the telephone in dispatching tugs will not only prove a big time saver, it is believed, but it is expected that the efficiency of the tugs and barges will be greatly increased.

Personal Items from the Field

W. W. Harris, manager for the Cumberland Telephone & Telegraph Co., at Dawson Springs, Ky., has been transferred to Sebree, Ky.

E. C. Hartley, commercial agent of the Nebraska Telephone Co., at Omaha, has been appointed to the newly created position of commercial engineer.

David C. Hall, traffic chief for the Cumberland Telephone & Telegraph Co., at Owensboro, Ky., has been promoted to a similar position at Frankfort, Ky.

F. A. May, district manager of the Nebraska Telephone Co., at Grand Island, Neb., has been promoted to commercial superintendent to succeed L. B. Wilson.

G. T. Wyche, of the division traffic chief's office at Louisville, Ky., has been appointed traffic chief of the Cumberland Telephone & Telegraph Co., at Owensboro, Ky.

W. H. Owens, of Philadelphia, Pa., has been appointed manager of division 1 of the Cumberland Valley Telephone Co., which includes Harrisburg, Steelton, Middletown, Hummelstown, Marysville and Duncannon, Pa.

H. C. Larrabee, of Portland, Ore., has been appointed manager of the Belle Plaine Telephone Co., of Belle Plaine, Iowa. Mr. Larrabee was formerly manager of the Greene County Telephone Co., of Waynesburg, Pa., and more recently in the sales engineering department of the Garford Mfg. Co.

L. B. Wilson, for several years commercial superintendent for the Nebraska Telephone Co., at Omaha, has been promoted to the newly created position of special agent, with jurisdiction in Minnesota, Iowa, Nebraska and both Dakotas. His work will be in some measure as an assistant to G. H. Pratt, general commercial superintendent.

Carl Metz, for a number of years connected with the Central Union Telephone Co., at Columbus, Ohio, has been made general wire chief for Compannie Telephonica Estado De São Paulo, Brazil, and has sailed for Rio Janeiro to enter upon his duties. As district wire chief at Columbus, Mr. Metz established such a reputation for efficiency that his name was given to C. M. Mauseau, general manager of the Brazilian company, who was in this country looking for an expert of this kind. Mr. Metz began with the Central Union as a lineman. He is a prominent Jovian, being the present statesman for Ohio.

Charles S. Norton, who for years was secretary and treasurer of the Indianapolis Telephone Co., of Indianapolis, Ind., has resigned to accept a position with the receivers of the Central Union Telephone Co. Mr. Norton was connected with the Independent telephone movement from the beginning, and was the organizer and president of the state association for several years. He began service with the Citizens' Telephone Co., of Columbus, Ind., as a lineman in 1895. In 1905 he organized the state association and was its president until 1910. He also was secretary and treasurer of the Citizens' Telephone Co., of Columbus; the Martinsville Telephone Co., the Lebanon Telephone Co., the Franklin Telephone Co., and the Fountain Telephone Co., of Covington.

Obituary.

D. Leet Wilson, one of the incorporators and first president of the Central District & Printing Telegraph Co., now the Bell Telephone Co. of Pennsylvania, passed away on November 9 at his residence in Pittsburgh after a brief illness.

Mr. Wilson was born in Washington, Pa., in 1840. He came to Pittsburgh when a young man and engaged in the banking business, later becoming president of the Fort Pitt National Bank.

At the time of his death Mr. Wilson was vice-president of the Central District Telephone Co., a director of the Fidelity Title & Trust Co., of the Safe Deposit & Trust Co., of the People's National Bank; a trustee of the People's Savings Bank, a director of the Pittsburgh & Lake Erie Railroad.

C. W. Hotchkiss, president of the Chi-

When a "SIMPLEX" JACK Takes Hold Something's *Got* to Give Way — and *It Isn't the* JACK

It's the "*irresistible force*" that makes the "immovable object"—*Move!*

In pulling telephone poles for instance.

And you *don't have to do any Digging* around the pole-base, even in hard-baked clay, hard-packed slag, cement or street paving.

After the chain is wrapped around the pole and pulled tight through its end-link—a stout quick pull on the Jack simply *yanks* the pole free from its 7 ft. bond—no matter what that bond is.

Then, after it is thus ripped free from its moorings, it is an easy matter to "pump" it out of its hole.

The Simplex 318 Pole Jack pivots on its base, following the drift of the pole as it is eased down.

The Commonwealth Edison Company, Chicago, tell us of pulling a big 40 ft. pole from seven feet of solid, dry clay in *eight* minutes—without touching the earth around the pole.

How many hours would it have taken 4 men to *dig* that pole out of the ground?

The Simplex Jack *can't break* under any stress that the big 17 lb. Verona steel lever will endure.

And it can't *let down* because it locks automatically and absolutely, in every new position of the Ratchet bar.

For pulling, straightening or reinforcing poles of all sizes, under all conditions, the Simplex 318 Pole Jack is a fabulous dividend-payer.

Templeton Kenly & Co., Ltd.

1020 So. Central Ave., Chicago

Price $28.00 f. o. b. Chicago.
The first dozen poles handled may easily save the whole cost of the Simplex.
Order one now; we can talk quantities later.

cago Tunnel Co. and of the Illinois Independent Telephone & Telegraph Co., of Chicago, died recently at Battle Creek, Mich., from organic heart disease.

JOHN A. BARRETT, inventor and electrical engineer, associated for many years with the American Telephone & Telegraph Co., recently passed away at his home in Maplewood, N. J., after a long illness. He was in his fifty-eighth year.

Mr. Barrett was one of the best known engineers in telephone and telegraph circles in the world. He was born in Woodstock, Vt., and was educated at Dartmouth and Middlebury Colleges. From 1882 to 1884 he was associated with the Western Union Electric Co., and founded the firm of Barrett Brothers. In 1886 he was employed by the A. T. & T. Co. to solve the "cross talks" difficulty on the first long distance telephone—from New York to Philadelphia. He invented the transposition system, which remedied the existing conditions, and which is now used the world over.

Mr. Barrett's next business venture was the organization of the Elektron Co., of which he was first president, and which put forth the first storage battery automobile. In 1890 he rejoined the A. T & T. Co.'s forces and since then had played a big part in all of that company's electrical undertakings.

He is credited with being the first man to use paper insulation. Mr. Barrett was a member of the D. K. E., American Society of Engineers and the University Club of Denver.

From Factory and Salesroom

Conventions: Canada, Toronto, Nov. 22-23; Ohio, Columbus, Nov. 23-24; U. S. Association, Chicago, Dec. 5-8; Kansas, Topeka, Dec. 19-21; Nebraska, Lincoln, Jan. 10-12; South Dakota, Aberdeen, Jan. 16, 17 and 18; Minnesota, St. Paul, Jan. 23-25; Wisconsin, Madison, Feb. 6-8; Oklahoma, Oklahoma City, Feb. 19-20; Texas, Dallas, Feb. 22-23; Iowa, Des Moines, March 13-15.

The Stromberg-Carlson Telephone Apparatus Committee.

In the accompanying illustration is shown the apparatus committee of the Stromberg-Carlson organization at work in the executive offices of the company at Rochester, N. Y.

This committee is composed of men who have been connected with the Stromberg-Carlson company for many years and also those formerly with the Garford Mfg. Co., at Elyria, Ohio. In order from left to right they are: A. M. Haubrich, E. G. Eidam, Eugene A. Reinke, W. Roy McCanne, Ray H. Manson, George A. Scoville and Sidney A. Beyland.

Members of the Apparatus Committee of the Stromberg-Carlson Telephone Mfg. Co.

These men get together for a steady two-day session every other week and decide upon the standardization and improvement of both Stromberg-Carlson and Garford products. The objective point of their labors is to produce a complete line of apparatus that will include the best features of the various parts manufactured by both companies prior the purchase of the Garford Mfg. Co.'s telephone business and telephone assets by the Stromberg-Carlson Telephone Mfg. Co.

The efforts of this committee are beginning to show results. Many new and improved pieces of equipment have been completed and are now undergoing the usual operating tests in the company's electrical and mechanical laboratories, to make doubly sure that they are flawless before announcing them to the telephone buying public.

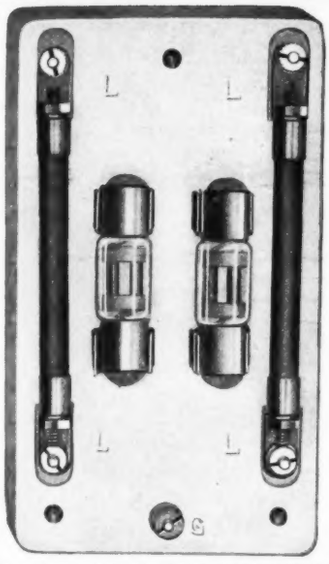
Testing of Its Cords by the Kellogg Company.

Everyone knows to what severe wear telephone cords are subject, but the Kellogg company, to assure offering the best in its cordage, has devised a machine for most rigidly testing cords for every conceivable kind of wear.

Switchboard cords are subject to considerable wear, for instance, due to the rubbing against the plug seat when making connections and disconnections. The Kellogg Switchboard & Supply Co. has increased the life of its switchboard cords by using very durable material which it is said reduces this wear and tear to a minimum.

But to prevent any doubt as to the continuous quality of its cords it has built a special machine for testing the wearing qualities. This machine should prove as efficient as the one recently built and described, for testing enameled wire.

This apparatus, illustrated, is automatically operated; the cords are attached to the hooks at the top and are wound once around the rod, made up with a series of conical surfaces, and then fastened at the bottom to weights, which prevent the cords from becoming slack. The sliding rod is operated up and down, which produces the severest wear possible due to the hard rubbing of the cords. A head receiver, connected with each cord tells



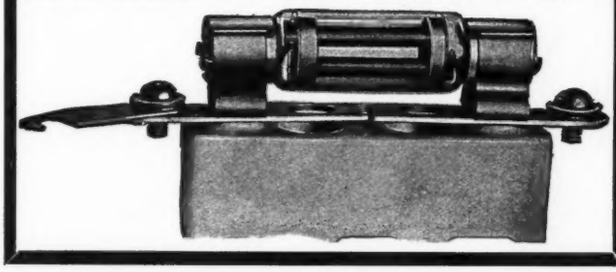
Brach Vacuum Arresters

Are you still maintaining your arresters or have you adopted the BRACH VACUUM SINGLE LINE TYPE NO. 36, or DOUBLE LINE TYPE NO. 40?

This arrester cannot ground or cause noisy lines

MAIN OFFICE AND FACTORY
127-129 Sussex Avenue
NEWARK, N. J.

L. S. BRACH SUPPLY COMPANY



We Are Ready for Winter Are You?

Have you chosen **the any-weather** conduit—not affected by frost, by water, by live steam? And also electrolysis-proof, acid-proof, alkali-proof—

ORANGEBURG FIBRE CONDUIT

The **permanent** conduit. Its light weight cuts costs, but it's strong. WE ARE READY FOR RUSH ORDERS—ARE YOU? Write for Book "H."

THE FIBRE CONDUIT COMPANY
ORANGEBURG, N. Y.

New York Boston Chicago San Francisco

Rebuilt Bargains

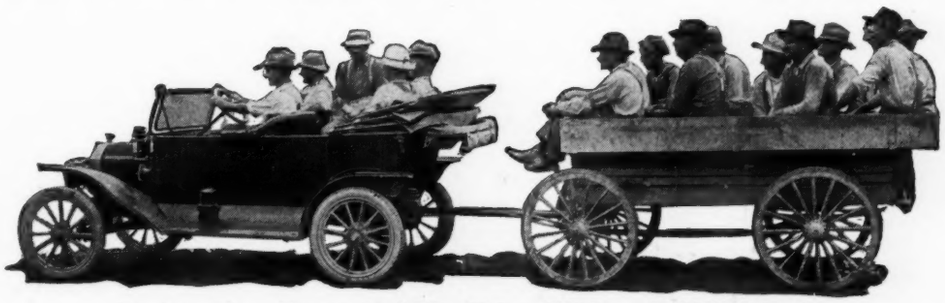
KELLOGG golden oak finish, 150-line capacity magneto switchboard, fully equipped with 130 No. 3-A, 10 ohm series, and 20 No. 3-C, .1000 ohm bridging, self-restoring combined line drops and jacks, and the following operator's equipment: 15 pairs of plugs and cords, 15 listening and double ringing keys, 15 single supervision ring off drops, power and hand generator switch key, hand generator, operator's suspended type transmitter, head band receiver and complete night bell equipment, also 15 feet of full capacity line cable from base of board **$275.00**

KELLOGG boards with equipment as above, equipped with 8 order wire keys and 30 flash light transfer circuits **300.00**

For complete list of standard apparatus refer to our REBUILT BARGAIN BULLETIN No. 6 (Free on Request). Stock received since Bulletin was published shown in our TELEPHONY ads.

Rebuilt Telephone Equipment Company
2127-2129 West 21st Street Chicago, Ill.

Did you ever figure your hauling expense?



Saving Two Extra 20-Mile Trips With a MIAMI Trailer

A MIAMI TRAILER Will Greatly Reduce It

Think of the saving of workmen's time—the time you have to pay for. The trailer is carrying a load equal to double the capacity of the car—can you see the saving? The Miami can be used for hauling poles, stringing wires and all miscellaneous work. Figure out how much such a trailer can save you and the figures will tell you you need a MIAMI.

Miami Trailers are designed and built for automobile speed—equipped with Timken axles and roller bearings, artillery wheels, oil tempered springs and special shock absorbing drawbar. Trailer tracks perfectly, the special draw-bar eliminates jerking, so that both car and trailer ride easily on rough roads. They will outlast your machine.

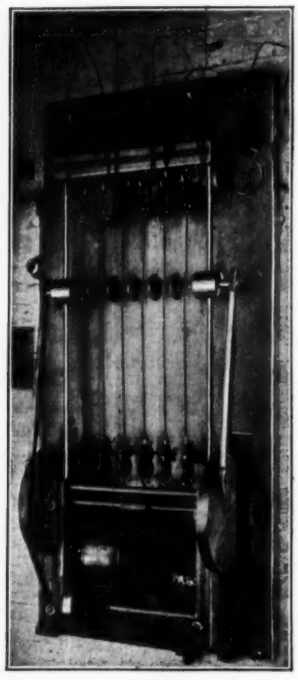
Submit your hauling proposition to us.
If we can't save you money we'll say so.

THE MIAMI TRAILER CO., Troy, Miami County, Ohio

Please tell the Advertiser you saw his Advertisement in TELEPHONY.

when, eventually, the conductors begin to weaken.

The outcome of these tests, it is contended, prove that the Kellogg cords are unequaled for wearing qualities. Like all other Kellogg apparatus, only the best materials are used, and they are made



Cord Testing Equipment.

up in the way that the result of 19 years' experience has proven best.

The Kellogg cord department is said to be the largest of its kind, being equipped entirely with modern machinery.

New Booklet Issued on Conduit Installation Work.

An unusually attractive booklet descriptive of McRoy-Camp vitrified salt-glazed conduit has been issued by the National Fireproofing Co., of Pittsburgh, Pa. The booklet contains 54 pages, printed on an excellent grade of enameled paper, and is profusely illustrated.

The trend of the times, the introduction states, is towards the elimination of overhead electric wires and the main factor in bringing about the change is the army of alert electrical engineers, who are always looking for means to improve the service, cheapen the cost and prevent interruption.

As a handbook the booklet is of great value, for it contains most complete information and data relative to conduit installation work. Taking up the various types of construction, installation methods are considered which are adapted for various purposes.

An interesting section is that entitled "Cost of Underground Construction," in which many figures are given facilitating the making of estimates for conduit construction. The matter of inspection, shipment and specifications is also fully treated.

Altogether the booklet is well worth a place in the library of telephone men having to do with conduit construction. Copies may be obtained from the National Fireproofing Co., at Pittsburgh, Pa., upon request.

Lexington Recording Board Awarded to Stromberg-Carlson.

The Stromberg-Carlson Telephone Mfg. Co. announces that it has been awarded a contract for a combined toll recording, supervisors' and observation switchboard by the Fayette Home Telephone Co. of Lexington, Ky.

This board consists of three two-position, five-panel, low type steel framework Garford sections with dark mahogany finish. The first three position will be arranged for recording purposes. The fourth position will not be equipped for present operation. The fifth and sixth positions will be equipped for supervisors' and observation purposes.

An 18-in. cable panel will be fitted at the initial end of the board and the sections throughout will be provided with lift-out doors and panels. These are to be placed beneath the keyshelves and in the rear of the sections. The lower front rail is to be provided with formica kick mats; otherwise the plug shelves and keyboard will be covered in a similar manner and finished in dull black.

New Independent Company Has Formal Opening.

The Union City Independent Telephone Co., Union City, Tenn., has completed the construction of what is said to be the most modern magneto exchange in Western Tennessee. It occupies a position of importance, as it forms a much needed connecting link between the border exchanges in Southern Kentucky and Western Tennessee.

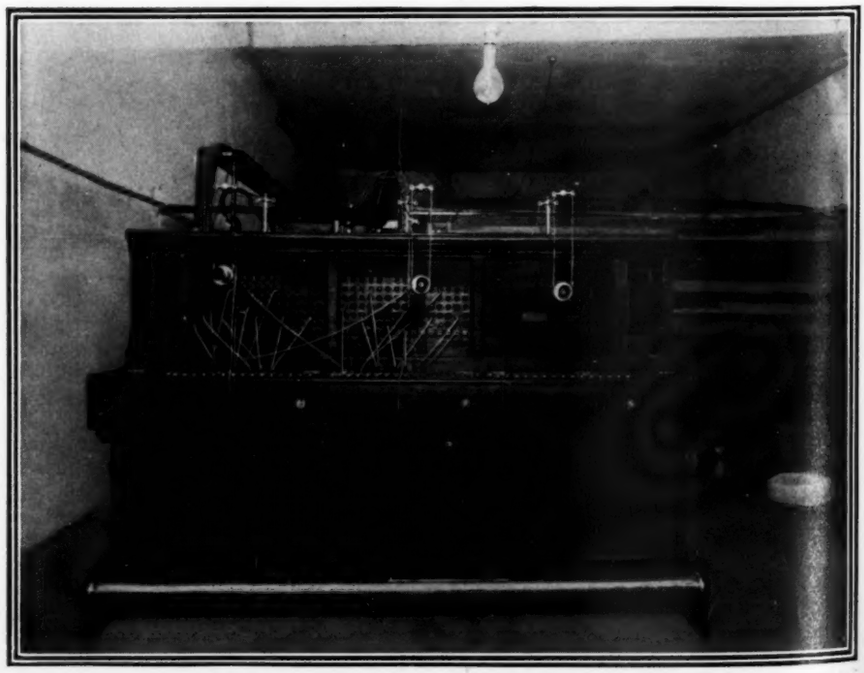
In competition with the Cumberland Telephone & Telegraph Co. the new organization has succeeded in winning the united support of merchants, residents and farmers, and has already cut in more than 300 stations.

Its contract for central office equipment, telephones and all construction material was placed with the Chicago Telephone Supply Co., Elkhart, Ind. The accompanying illustration shows the new switchboard, which is the standard Chicago three-position type, wired complete for an ultimate capacity of 450 lines. Each position is equipped with 15 cord circuits, double supervisory, with double banks of clear-outs, condensers, etc., possessing the positive ring-off and non-ring-through features.

Many managers of neighboring exchanges, who have inspected the new switchboard, have remarked favorably upon the completeness of the equipment, which includes four-party master keys, ring-through, talk-through repeating coils, lamp transfers, monitor circuit, order keys, pilot lamps, busy test circuits, etc.

The arrangement of parts and the omission of any but narrow dividing strips between positions make it speedy in operation and eliminates much of the trunking, which ordinarily would be made necessary on a board of this capacity.

Exchange managers interested in generator-call switchboards of this type, can secure more complete specifications by writing to the Chicago Telephone Supply Co., Elkhart, Ind.



New Chicago Magneto Board of Union City Independent Telephone Co., Union City, Tenn.